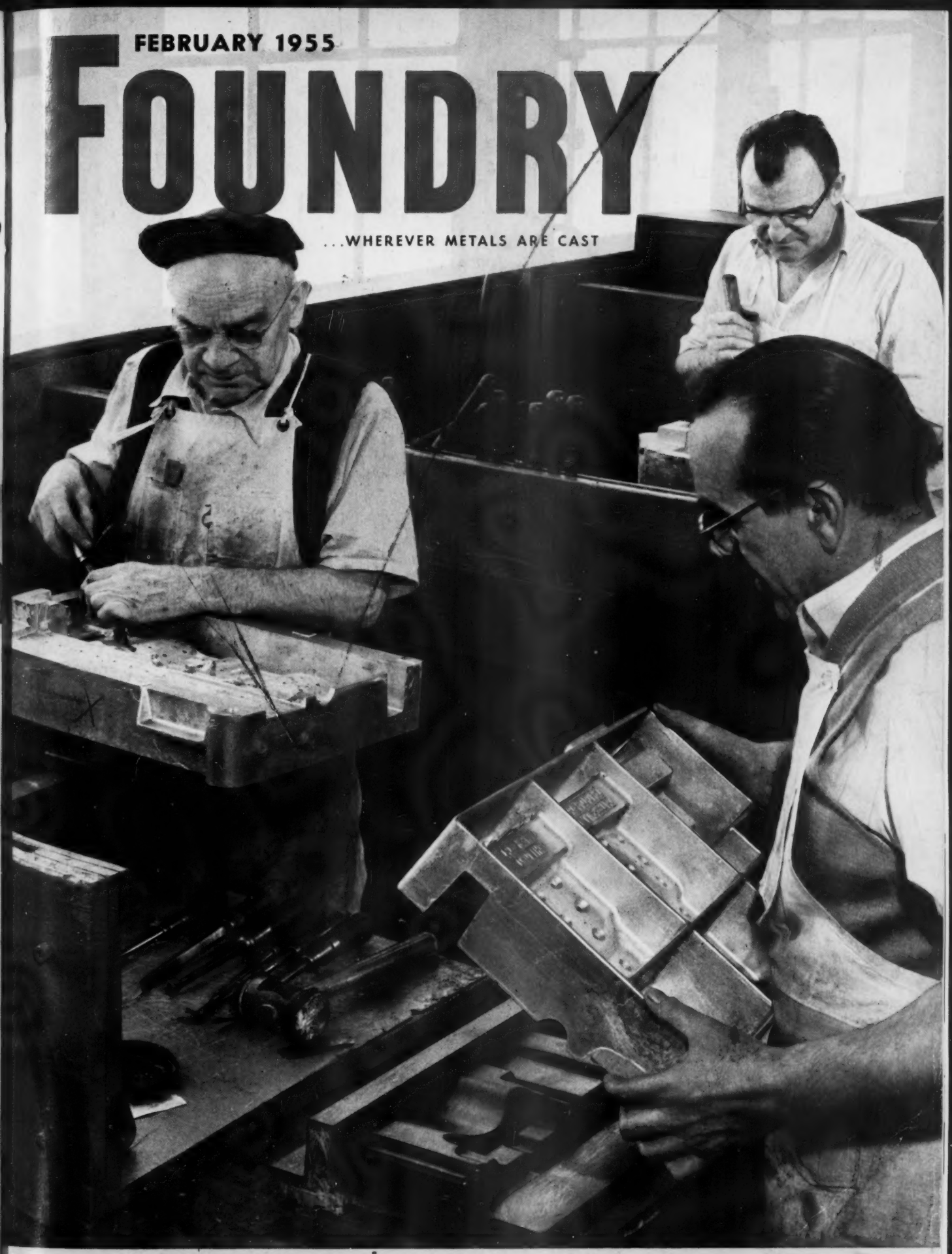
FEBRUARY 1955

FOUNDRY

...WHEREVER METALS ARE CAST

Naymik



GOOD PATTERNS

Proper Planning—p. 100

Mechanized Cleaning—p. 82
Work Simplification—p. 78
Basic-Lined Cupola—p. 88
Insulated Risers—p. 92

PURITE saves money 8 ways!

1. Purite produces higher percentages of finished castings—fewer rejects per ton of metal poured.
2. Purite gives 100% fluxing action in the cupola —100% desulphurizing action in the ladle.
3. Purite is time-tested and proved for rapid and unsurpassed desulphurizing uniformity.
4. Purite permits the use of higher-sulphur raw materials.
5. Purite is 100% pure fused soda ash—you do not pay for inert materials.
6. Purite comes in uniform 2-lb. pigs—no weighing or measuring required.
7. Purite does not crumble—is easy to handle —no waste, no dust.
8. Purite can be shipped in bulk carloads at substantial savings over bag shipments—is easily stored without deterioration.

Purite, the scientific flux for better melting and cleaner iron, is sold by leading foundry supply houses in the United States and Canada.

MATHIESON

MATHIESON CHEMICALS
OLIN MATHIESON CHEMICAL CORPORATION
INDUSTRIAL CHEMICALS DIVISION • BALTIMORE 3, MD.

From 18 inches to a Feather-edge in Section

...or how Chuck Wright uses a 16-ton casting to bust bubbles

"Do you know why a big ship uses as many as 6 propellers during its life at sea?" asked Chuck Wright, INCO distributor foundry specialist.

"Blame the water," said Chuck. "Salt water, especially, eats away at the usual bronze in a large propeller. And bursting bubbles take a toll, too, when blades churn the water. Engineers call it *cavitation.*

"Propeller makers have known for years that nickel-aluminum bronze resists cavitation . . . four to six times better than manganese bronze. But nobody could tell you why the nickel alloy had never been tried in a big ship's wheel.

"When a sizeable propeller was first suggested by INCO, a barrage of questions greeted the proposal. How would you control large grain growth in the heavy hub? Could it be done by deep chilling? And what would risering practice be?

"Some foundrymen thought the gating and risering might be too difficult. Others said greatly differing section sizes would cause such different physicals, they couldn't be tolerated in one casting. The cost of pioneering was also mentioned.

"Baldwin-Lima-Hamilton, however . . . figuring the advantages to be gained far outweighed the risk involved . . . got an order from the U. S. Lines and made a 5-bladed 13 ton wheel of Nialite, their trade named nickel-aluminum bronze alloy. And listen to the results . . .

"The 4-bladed standard manganese bronze wheel it replaced on the S. S. American Clipper weighed 15½ tons. The new one is lighter by about 20%. It has thinner and therefore more efficient blades, thanks to its high corrosion-fatigue limit in salt water. And it puts less loading stresses on tailshaft. But here's the big pay-off . . .

"After twenty months' transatlantic service, the finish-grinding 'swirl marks' . . . which quickly disappear from the usual bronze wheel . . . were still clearly visible on this casting. While drydocked for inspection, you could actually see the superiority of this nickel alloy's resistance to cavitation, erosion and corrosion.

"So when anybody says 'it can't be done,' the Nialite wheel cast by those foundrymen near Philadelphia comes in handy for 'busting' bubbles.

"Even if you don't make 20-foot propellers . . . whenever your problem takes in the metallurgy of castings, I'll be glad to give you some practical help. Just drop me a line."

INCO TRADE MARK

Chuck Wright

The International Nickel Company, Inc.

67 Wall Street New York 5, N. Y.

EASY SAND CONTROL

You take Federal's CROWN HILL Seacoal, GREEN BOND Bentonite and Federal SAND STABILIZER and you've got yourself three sand additives that will really simplify your sand control and provide uniform, thoroughly satisfactory results.

These three materials, added in varying amounts to your sand, dry or in slurry form, will give you close control over carbon content, green and dry strength, and will also provide GREATER FLOWABILITY, with LESS LUMPY SHAKEOUT.

CROWN HILL Seacoal is exceptionally low in sulphur content—which means your castings will have more easily-machined surfaces. GREEN BOND Bentonite is unexcelled in its ability to develop and control green and dry strength. It lasts and lasts—retaining its bonding efficiency much longer than any other clay. Its medium to low viscosity characteristics enable you to cut down on mulling time—permits slurry users to add more bentonite per gallon of slurry, for just the strength desired, without strain on the pumping system. Federal SAND STABILIZER improves resistance to expansion defects and increases flowability—thus increasing uniformity of mold hardness. It sharply reduces viscosity of slurry, without decreasing bond strength per gallon of slurry. And it provides better, LESS LUMPY SHAKEOUT without adding other clays to sand mixtures.

Yes, these Federal additives really simplify your sand control and give you excellent results. But, that's not all! *Their cost will not exceed $1.00 per ton of castings produced!* To learn more about these efficient additives, write for your copy of our bulletin on "Tailor-Made Molding Sands".

IMPORTANT

FOR SLURRY USERS!

The addition of Federal SAND STABILIZER to your slurry will definitely reduce its viscosity and increase its green strength. This enables you to add a greater percentage of Granulated GREEN BOND Bentonite* to your slurry—producing a more highly concentrated strength per gallon of slurry (lower water content)—with *less strain* on the pumping system and *no clogging* of pipe lines.

*Federal GREEN BOND Bentonite is available in three convenient forms:

(1) PULVERIZED—for general foundry use as a dry additive, for core or molding sand.

(2) GB-100 FINE GRANULAR—a dry additive with low dust content, for core or molding sand.

(3) NO. 1200 SLURRY GRADE GRANULAR—for use as a wet additive.

All three grades have medium to low viscosity properties.

FEDERAL

If you have "lumpy shakeout" — use Federal SAND STABILIZER!

The **FEDERAL FOUNDRY SUPPLY** *Company*

4600 EAST 71st STREET, CLEVELAND 5, OHIO

CROWN HILL W. VA. • CHICAGO • DETROIT • MILWAUKEE • RICHMOND VA. • ST. LOUIS • CHATTANOOGA • NEW YORK • UPTON, WYO.

IN TWIN CITIES C. D. Gallaher Company, 428 Stinson Blvd., Minneapolis

FOUNDRY

February 1955

Volume 83—Number 2

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THE COVER: Thorough advance planning combined with skilled craftsmanship produces quality patterns at Motor Patterns Co., Cleveland. Story on page 100

SPECIAL ARTICLES

Partners in Progress *(Editorial)* 77

Simplifying the Work Can Reduce Costs 78
To remain competitive, foundries must reduce labor per unit of production. Work simplification is one way to do the job—By W. C. CHEEK

Small Foundries Can Afford Better Cleaning Departments 82
Many advantages accrue to the small foundry that has a modern cleaning room fitted with automatic equipment—By E. F. ANDERSON

Importance of Slag Control in Acid Cupola Operations 84
To produce quality cast iron a knowledge of slag-metal reactions is essential so melting techniques can be controlled—By E. A. LORIA

Operating Practice with the Basic-Lined Cupola 88
Basic cupola linings are more expensive than acid linings but author reports there are various offsetting advantages—By CHARLES GREENLEE

Rice and Oat Hulls as Riser Insulation 92
A report on experiments using oat and rice hulls as antipiping insulating compounds to prevent skin formation—By S. L. GERTSMAN and R. K. BUHR

Related Information for Foundry Apprentices 95
How much related information to amplify on-the-job training should be given the apprentice? Here's one successful program—By MAURICE SANDES

Properties of Cast Iron at Elevated Temperatures 96
Progress report on a study of load-carrying ability of cast iron in the temperature range of 700-1000°F.—By J. R. KATTUS

Simplified Design Cuts Cost on Large Casting 98

Planning Influences Pattern Quality By ROBERT H. HERRMANN 100

GIFS Analyzes the Gray Iron Industry 123

Rammed Linings for Indirect Arc Furnaces By E. LENS JR. 126

Trouble Shooting By C. W. AMMEN 130

Man-to-Man By RALPH L. LEE 136

Heat Treatment of Gray Iron 152

Incentive Plan in the Cleaning Room By R. V. SHAFFER 168

High-Speed Production of Shell Cores By FRANZ SCHUMACHER 178

High School Students Learn Foundry Practice By ARCHER MARTIN 225

NEWS FEATURES

Around the Country	198	Late Foundry News	33
Calendar of Meetings	14	Men of Industry	112
Foundry Group Activities	158	News Views	196
Industry Briefs	146	Obituary	149

REGULAR DEPARTMENTS

Classified Advertising	260	Questions and Answers	106
Data Sheet	143	Readers' Comment	72
Foundry Developments	140	The Shakeout	254
How To Do It	128	Statistics	193
Ideas for Foundrymen	209	Trade Publications	250
New Equipment and Supplies	206	With the Editors	10

Business Staff—page 271

Advertisers' Index—page 271

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WHERE ACCURACY COUNTS

49 inch shell has maximum diameter of 11 inches. 1500 pounds of metal is poured into each mold to obtain a finished casting weighing 600 lb. High precision cored cavity is shown at right.

Core assembly is shown in stages from front to rear. Stacked body cores are secured by steel rods. Barrel cores are inserted after first five body cores have been assembled.

LINOIL — ADM D-PROCESS OILS — FREFLO — LINOCEL — INDUCTOL — ADMIRE

"ZERO IN" ON THE COMPLETE LINE OF ADM QUALITY FOUNDRY PRODUCTS

LINOIL

SCORES A DIRECT HIT!

UNIQUE CAST ARTILLERY SHELLS ARE HELD TO CRITICAL DIMENSIONS AT

AUTO SPECIALTIES MFG. CO.

(RIVERSIDE CRANKSHAFT DIV.)
ST. JOSEPH, MICHIGAN

Aberdeen Proving Grounds, after testing cast artillery shells, concluded that no other means of shell manufacture has been proven to an equal degree of accuracy . . . 5 rounds within a 29-yard square at 23,000 yards range.

The Riverside Crankshaft Division of Auto Specialties Mfg. Co. has proven the extreme accuracy of cast shells beyond a doubt.

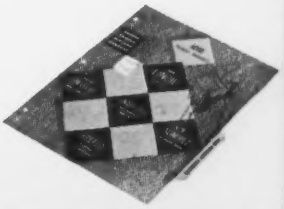
The 280 mm. shell illustrated is a core job inside and out . . . from start to finish. Molds are made up of baked cores stacked 18 high while the cavity is formed by a barrel core held to the exacting concentricity of ± .025 inches.

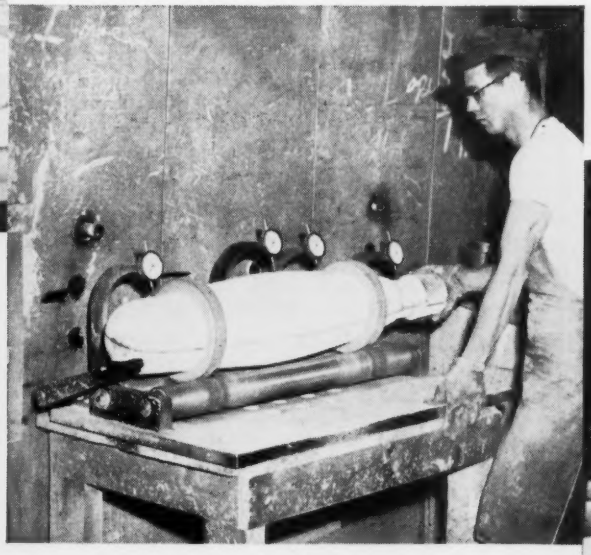
In cases like this, where the precision of the work is dependent upon the cores . . . and core accuracy is the prime target, LINOIL scores a direct hit! . . . as proven by Auto Specialties. Every batch of mix, whether for barrel, body or gating cores, uses rigidly controlled volumes of LINOIL. The uniformity of LINOIL eliminates the need for varying mixtures and plays a vital role in quality control.

Your LINOIL man will help you select specific-purpose core oils to answer your problems. Call him today, or write to ADM at the address below.

AVAILABLE TO FOUNDRIES

Continuous Technical Information Service on the latest developments from the ADM Sand Laboratory . . . furnished in handy file-folder form for quick reference. A request on your letterhead will put your name on our permanent Technical Information mailing list.





Barrel cores are made of halves pasted together . . . then tested for concentricity tolerance of ± .025.

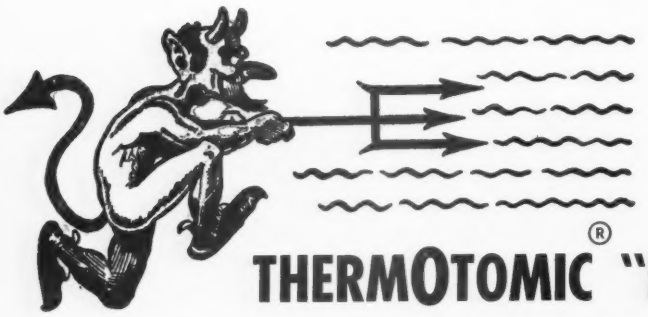
Molds, when assembled are 84 inches high. Pouring requires catwalks and special clothing for safety.

ARCHER • DANIELS • MIDLAND COMPANY
991 WEST 110th STREET CLEVELAND 2, OHIO

FOUNDRY PRODUCTS DIVISION

Produce More Castings Per Heat

with



Soffel's®

THERMOTOMIC "HOTOP" LIQUIDIZER

Exothermic Carbon Free Liquidizer For Iron, Steel, Nodular Iron

This new head compound saves feeding metal in risers or feeding heads which can now be reduced in height 40 to 70%

SOFFEL'S THERMOTOMIC HOTOP CARBON FREE LIQUIDIZER is different from other head compounds in that HOTOP LIQUIDIZER does NOT contain powdered metal, is NOT a thermit compound. It is a patented exothermic compound entirely free of carbon, sulfur and phosphorus and can be used without danger of contamination on any ferrous metal or alloy.

HOTOP LIQUIDIZER also saves molding time as less sand is needed in the mold cope due to short height of risers. HOTOP LIQUIDIZER produces a liquid slag well over 4000° F. of heat and insulates the metal. The feeding metal will remain liquid at least 50% longer assuring adequate feeding while the casting cools and solidifies. Piping and shrink cavities caused by premature freezing of the feeding metal are eliminated.

THERMOTOMIC HOTOP LIQUIDIZER BRAND "B" SHOULD BE USED ON RISERS UNDER 4 INCHES IN DIAMETER

GUARANTEED TO PRODUCE SOLID CLEAN CASTINGS

SOFFEL'S FAMOUS CARBON FREE LIQUIDIZER FOR ALL METALS and ALLOYS

SOFFEL'S EXOTHERMIC CARBON FREE LIQUIDIZER is the leader in major foundries for use on both ferrous and non-ferrous metals and also in ingot production. It is the original scientific non-carbon, exothermic compound for feeding heads and risers.

When applied on the heads or risers CARBON FREE LIQUIDIZER reacts within itself exothermically, producing a temperature above 3200° F. It actually increases the temperature of the feeding metal to a point well above that of the metal in the main body of the casting, thus ensuring that the feeding metal will be the last to freeze. In this manner, shrink cavities in the casting caused by premature freezing of the feeding heads will be eliminated. After the exothermic action has ceased, the LIQUIDIZER forms a soft refractory insulating blanket on the metal. This confines the heat generated by the LIQUIDIZER and aids in maintaining the desired high temperature of the feeding metal in the heads or risers.

SOFFEL'S THERMOTOMIC COMPOUND
PATENTED
FOR ALL METALS and ALLOYS

THERMOTOMIC COMPOUND is a patented Exothermic compound that can be molded into any desired shapes and used as feeding ring inserts under risers or as facing application where it is desired to maintain fluidity of the casting metal. THERMOTOMIC permits reversal of the trend towards large feeding heads and risers, making it possible to use heads that are shorter and more compact with 1½" feeder openings. This permits easy removal of the casting feeding heads and sharp reductions in cleaning and finishing costs. When THERMOTOMIC is used as inserts or as facing mixed with molding sand in the mold, heat at thin metal sections is retained until the thick main body of the casting has solidified, thus eliminating shrink cracks and improving grain structure and tensile strength. For use in green sand molds, use THERMOTOMIC W. P. (Waterproofed)

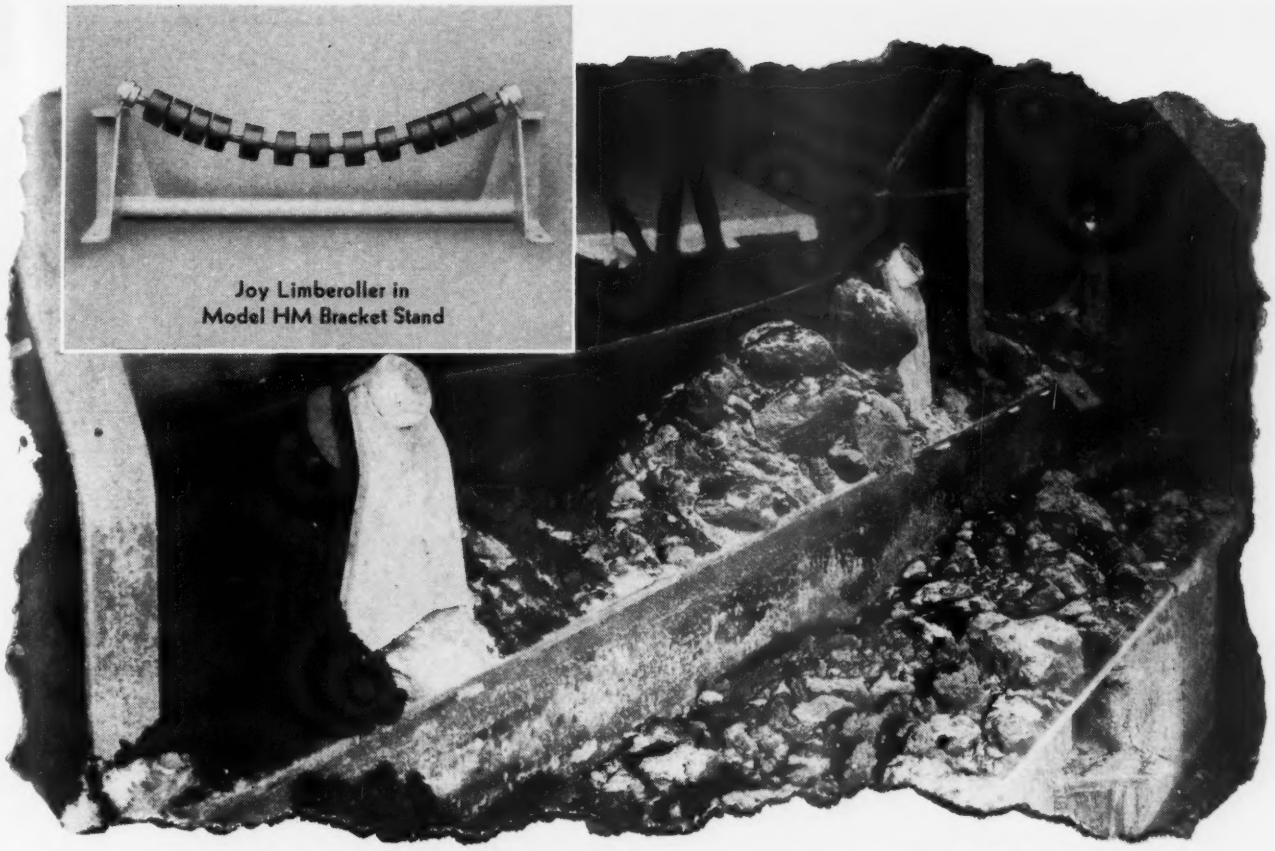
NOTE: SOFFEL'S CARBON FREE LIQUIDIZER NO. 5 is recommended for use on top of feeding heads in conjunction with THERMOTOMIC COMPOUND. For aluminum castings, use THERMOTOMIC ABC and AL-X31 LIQUIDIZER. When ordering a trial sample, advise the kind of metal to be used on.

U. S. Patents No. 2,490,327 and No. 2,500,097

PITTSBURGH METALS PURIFYING COMPANY

World's Largest Manufacturer of Fluxes and Purifiers For All Metals and Alloys

1352 MARVISTA ST., N. S. PITTSBURGH 12, PA.



Joy Limberoller in
Model HM Bracket Stand

IN THIS FOUNDRY'S SAND CONVEYOR, JOY IDLERS LAST EIGHT TIMES LONGER

TWO YEARS IN SERVICE Joy Limberollers . . . unique, 2-bearing, suspension idlers for belt conveyors . . . have successfully operated in a Midwestern magnesium foundry since February, 1953. They are still going strong after giving eight times the three-month life of conventional idlers.

SUPPORT 30" /30' BELT The Limberollers were installed on a conveyor belt which carries molding sand from a chute, up a 35° inclined plane, to a transverse belt.

NO BEARING FOULING The bearings are up out of the sand, unaffected by spillage. Fouled bearings, which stop the idler roll and cause damage to the belt, are no longer a problem.

EASY MAINTENANCE There are only two bearings on each idler . . . and that makes the maintenance men happy. They also like the ease with which the Limberoller can be removed . . . without stopping material flow . . . if and when maintenance becomes necessary.

MANAGEMENT HAPPY Such satisfactory service is welcomed by the foundry management. You will be pleased, too, when you discover how the Limberoller can increase efficiency of your belt conveyor operation. For details, see your Joy representative, or write for Bulletin LD-103 to ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada. *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

COMPLETE DETAILS ON THE NEW JOY LIMBEROLLER ARE GIVEN IN BULLETIN LD-103. WRITE FOR YOUR FREE COPY TODAY

Consult a Joy Engineer

about

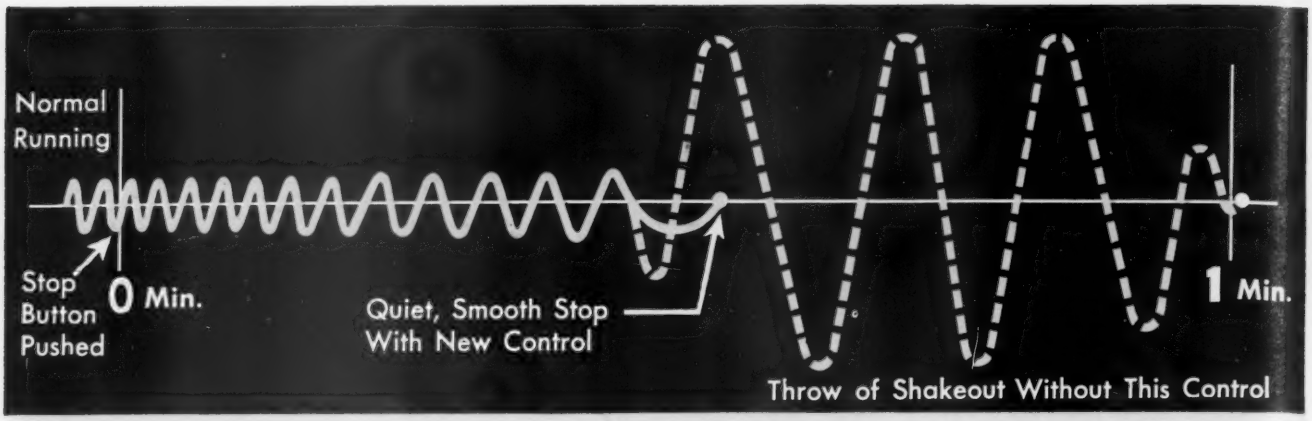
LIMBEROLLER

THE IDLER WITH FLEX APPEAL

W&D 15503

JOY

SINCE 1851—OVER 100 YEARS OF ENGINEERING LEADERSHIP



New

EXCLUSIVE* CONTROL ELIMINATES "Stopping Bounce"

Smooth...Quiet

"FOUNDROMATIC" SHAKEOUTS

OTHER ★ ADVANTAGES

- ★ Two-bearing *Foundromatic* design — simpler than any other — means only one dust seal, far fewer parts.
- ★ One-piece body construction . . . stress-relieved after welding . . . increases resistance to impact load.
- ★ Vigorous vibration for largest loads within rating — you don't have to buy extra capacity to get rapid shakeout.
- ★ Effective belt tension assured by specially designed pivoted motor base.

*Patented

Foundromatic shakeouts transmit no vibration when running; no vibration when stopping. Allis-Chalmers new exclusive* automatic snubber control reverses the motor to bring the shakeout to a smooth, quiet stop. Actually, electrical energy supplied by the control replaces mechanical snubbers. As a result, maintenance is reduced. Also, both motor and drive last longer. In addition, castings and flasks are not damaged by excessive throw.

Get complete facts on Foundromatic shakeouts with automatic snubber control from your nearby A-C district office, or write Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4256

Foundromatic is an Allis-Chalmers trademark.

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

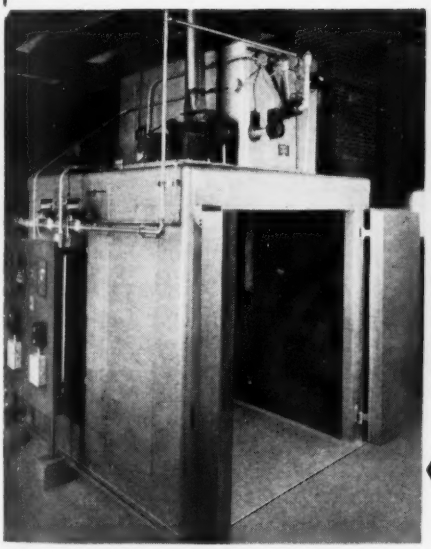
IS THE HEAVY HAND of OBSOLESCENCE

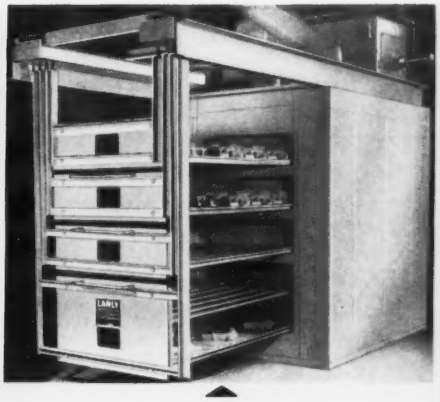
Retarding Your Production

OLD STYLE, INEFFICIENT CORE OVENS

with antiquated hand firing and charging methods can add appreciably to your operating costs.

Then too, there is the problem of a high percentage of rejects in old oven production. Can you afford this?





1. Drawer Type Oven

2. Single Compartment Rack Type Oven

3. Car Type Oven

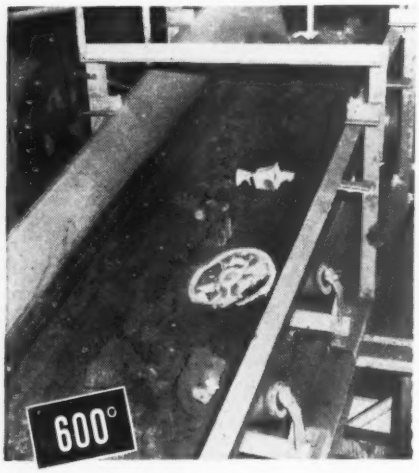
Isn't this an opportune time to examine closely the oven facilities of your foundry for a possible improvement? The average foundry requirements can be met with standard LANLY units. Custom designed units for core baking, pasting and mold drying are part of LANLY'S services, as well as ovens for casting conditioning and heat treating.

WRITE FOR THE LATEST CATALOG
AND FACTS ON ANY INSTALLATION

LANLY
FOUNDRY OVENS
THE LANLY COMPANY • 780 PROSPECT AVE
CLEVELAND, OHIO

It's never too hot
for an Imperial
Super-Insulated
Sahara Belt

At American Chain & Cable Co., this belt ran 24 hours a day, 5 days a week for over 2 years—handling hot shakeout sand with temperatures up to 500°. During this time production was accelerated and equipment operated at top speed.



$750 per hour shutdowns were eliminated by a farm implement company when they installed this belt to convey white-hot castings and knockout sand. Result: $30,000 saving in 12 months.

• • • • • •

Write for data sheet 54-2 and case histories on belts for handling hot materials.

Imperial
BELTING CO.
1755 S. KILBOURN AVE., CHICAGO 23, ILL.
You expect more from Imperial
. . . and you get more.

WITH THE EDITORS

THE SHAKEOUT: A new department presenting interesting articles on ideas, methods, processes, equipment, supplies and castings application was started in the January issue under the title of "The Shakeout." The editors hope that you found the first presentation, pages 242 and 244 of the January issue, interesting and helpful and that you will turn to page 254 of this issue to find this month's selection of items. Furthermore, do you have any ideas that you would care to contribute for the general development of the industry? If so, why not send them along?

—o—

Saying Thanks: While all chapters seem to express appreciation to speakers for the time and effort expended in appearing before the group, unusual methods now and then are developed by enterprising chapter officers. I encountered one of special interest one night when filling a speaking engagement before the Eastern New York Chapter at Albany. After the talk and a question-and-answer period from a kind and attentive audience, the meeting was turned back to Wm. C. Stevenson, foundry superintendent, Rensselaer Valve Co., Troy, N. Y., and chairman of the chapter, who presented a "Certificate of Appreciation" as reproduced below. Needless to say, I went away from that meeting with a feeling of warmth and friendship for the Eastern New York Chapter and its thoughtful officers. Thanks so much, Bill, for the thought behind this certificate.

—o—

Fine Looking Group: Since the sales representatives of a foundry equipment or foundry supply concern constitute the first line of communication between producers and the customers, I feel that it is a good idea to present them to the industry now and then through the advertising pages of your favorite business magazine. Therefore, I was especially pleased with the outside back cover advertisement of the C. O. Bartlett & Snow Co., Cleveland, in the January issue which showed photographs of the Cleveland sales, engineering and branch sales personnel and the company management under the heading, "Over 600 years of experience to make your foundry more profitable." Congratulations to the company on such a fine looking group of representatives.

—o—

Tough: Recently heard about some foundry boys starting a little poker game after a meeting. The cops arrived, hauled the boys to the pokey, and it was 4 a.m. before they were released. Things certainly are tough all over.

—o—

Knew the Business: On Dec. 16, the folks at the Foundry Products Division, Archer-Daniels-Midland Co.,

(Concluded on page 12)

Certificate of Appreciation

May it be known that
Frank G. Steinebach
was the Guest Speaker at the
American Foundrymen's Society
Eastern New York Chapter

As an expression of appreciation for courtesies extended to our members, we hereby present this certificate which bestows upon the bearer an Honorary Membership in this chapter.

Sigdon A Eliot Secretary on November 16-1954 Wm C Stevenson Chairman

Gunning for savings with HARBISON-WALKER

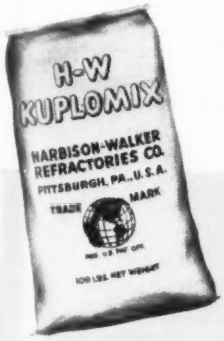
KUPLOMIX

Substantial savings in cupola maintenance are assured by the use of H-W KUPLOMIX—a modern refractory which provides joint free linings. In the foundry it is also used to good advantage for the linings of ladles and troughs.

H-W KUPLOMIX is easy to apply either by air-placement guns or by ramming. It is exceedingly resistant to the impact and abrasion of the charge, the erosive action of molten metal and slags and to the chemical attack of slags.

H-W KUPLOMIX consists of grain-sized silica quartzite of unusual purity and a highly refractory bond clay which develops a strong ceramic set at furnace temperatures.

Please write for complete information about H-W KUPLOMIX, the modern service-proved cupola refractory.



Harbison-Walker Refractories Company

AND SUBSIDIARIES

World's Largest Producer of Refractories

GENERAL OFFICES **PITTSBURGH 22, PA.**

Wood and Metal

For almost half a century we've been producing a tremendous variety of patterns . . . in a wide range of sizes . . . to fill many varied requirements.

Our trained personnel and complete pattern facilities enable us to solve even the most intricate design and production problems . . . like the huge bull ladle pattern illustrated.

Let us help you with your wood or metal pattern requirements . . . or with lightweight castings, aluminum or magnesium.

Send for our new catalog No. 53
or ask for a representative to call.

Well-Cast MAGNESIUM AND ALUMINUM CASTINGS
Well-Made WOOD AND METAL PATTERNS

Write for our New Catalog No. 53

THE WELLMAN BRONZE & ALUMINUM CO.
Dept. 7, 12800 Shaker Boulevard Cleveland 20, Ohio

(*Concluded from page* 10)

Cleveland, had a little ceremony to pay tribute to Irene M. Gerteis, for the fine job she has done over the years with that organization. Miss Gerteis was the first employee of the original company from which the present Foundry Products Division is an outgrowth. Those connected with ADM will tell you that for many of the nearly 40 years Miss Gerteis has

been connected with the organization, she has been the backbone of the home office organization and that a large share of the credit for the accurate and prompt handling of orders and the immediate response to a thousand and one details connected with the business should go to her. Customers of the firm knew of her abilities and knowledge of the business and would call her for help.

At the ceremony marking her retirement, Miss Gerteis was presented with a number of gifts, and the best wishes of the entire organization. The illustration above shows her receiving the presentation from L. P. Robinson, vice president.

—o—

Meeting Calendar: For a number of years each issue of FOUNDRY has presented a listing of "Meetings of Interest to Foundrymen." This feature includes meetings of a national and regional character of interest to rather large segments of the industry. Location of this information in the issue has varied according to problems of make-up and space available in the center of the magazine.

I use this calendar frequently in following the important meetings in the industry, and generally find it necessary to refer to the "Table of Contents" to get the page number in the particular issue. Perhaps readers have to do likewise. Therefore, to avoid the loss of time and effort necessitated by this search for a page number, the editors decided to give this feature a permanent spot. Starting with this issue you will find the "Meeting Calendar" on page 14 of each issue (two pages beyond this column). I hope you will make more use of this department in its new location.

F.G.S.

Why are EDCO Bottom Boards constructed of Magnesium Alloy?

Because of these specific advantages:

- light weight; lighter than wood, metal, steel, iron—and aluminum Bottom Boards too.
- won't break with rough handling—use your Edco Dowmetal Bottom Boards over and over again . . . they're *permanent* equipment.
- minimum heat retention due to great heat conductivity and radiation which results in rapid cooling.
- increase scrap savings by helping to produce castings true to pattern.

Wood Bottom Boards char, warp, burn easily. Metal boards are heavy; steel boards are unwieldy, costly to handle. Iron boards (even heavier than steel) crack or break if suddenly heated or cooled. Aluminum boards are difficult to clean, often crack because of abuse. And cemented Asbestos-type plates will break at corners and edges. The expense of an under-structure is often required too.

For safe, easy-to-handle, permanent equipment in your foundry, remember this fact: each of the 83 *standard* Edco sizes is constructed of magnesium alloy. Call Edco first next time you need "the right Bottom Board."

CHRISTIANSEN CORPORATION

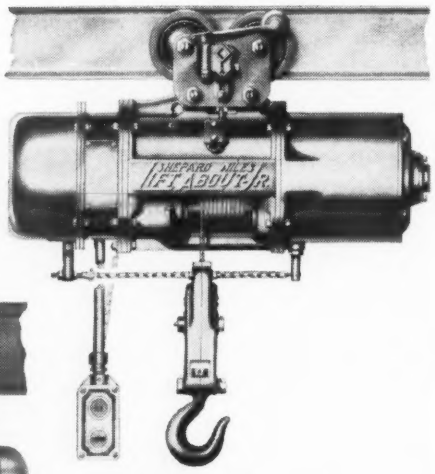
210 SOUTH MARION STREET • OAK PARK 1 (Chicago Suburb), ILLINOIS

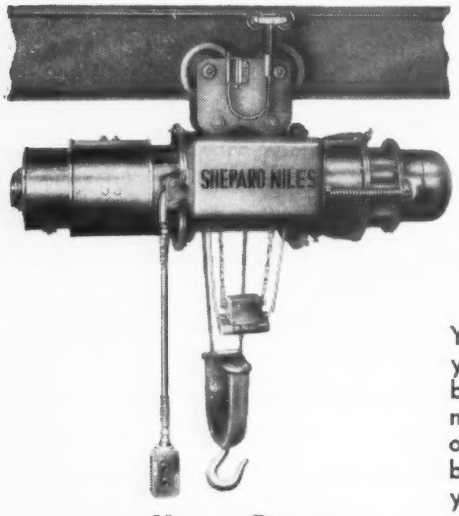
EDCO DOWMETAL BOTTOM BOARDS • EDCO ALUMINUM INGOT

SHEPARD NILES

LIFTING CHAMP

in the electric hoist field





Medium-Service
LIFT ABOUT-JR.

Heavy-Duty
SHEPARD NILES Hoist

YOU GET A HOIST that will lift your loads year after year when you buy one bearing the Shepard Niles name. Long after you've written it off, your Shepard Niles Hoist will be cutting costs, speeding work in your plant.

Shepard Niles offers you electric hoists of proven quality for cycle duty, heavy intermittent duty, medium duty and light-occasional service. Choice of medium and heavy capacities with slow, medium and fast speeds. Available with short to long lifts, standard or close headroom . . . manual or magnetic controls.

Send for Bulletin illustrating the complete line of Shepard Niles Hoists . . . request a representative to call. He'll show you why Shepard Niles is your best buy in electric hoists today.

CRANES
Overhead: Top Running, Inner Running Under Running. Floor or Cab Operated.

HOISTS
Operated from Cab, Floor or Pulpit.

America's Most Complete Line of Cranes and Hoists since 1903

SHEPARD NILES
CRANE AND HOIST CORPORATION

1360 SCHUYLER AVE., MONTOUR FALLS, N.Y.

MEETING CALENDAR

Feb. 7-9—American Management Association annual marketing conference, Statler Hotel New York

Feb. 8-9—American Welding Society and Illinois Institute of Technology, first Midwest welding conference, Armour Research Foundation of Illinois Institute of Technology Chicago

Feb. 10-11—Wisconsin Regional Foundry Conference, Schroeder Hotel, Milwaukee

Feb. 14-17—Industrial Ventilation Conference Michigan State College, East Lansing, Mich.

Feb. 14-18—American Institute of Mining and Metallurgical Engineers, annual meeting Conrad Hilton Hotel, Chicago

February 17-18—Southeastern Regional Foundry Conference, Tutwiler Hotel, Birmingham

Mar. 9-10—Foundry Educational Foundation, college-industry conference, Hotel Cleveland Cleveland

Mar. 14-15—Steel Founders' Society, annual meeting, Drake Hotel, Chicago

Mar. 25-26—California Regional Foundry Conference, Huntington Hotel, Pasadena, Calif.

Mar. 28-Apr. 1—American Society for Metals, ninth Western Metal Congress and Western Metal Exposition. Pan-Pacific Auditorium, Los Angeles

Apr. 7-8—Malleable Founders' Society, market development conference. Edgewater Beach Hotel, Chicago

Apr. 18-20—American Institute of Mining & Metallurgical Engineers, national open hearth conference, Bellevue-Stratford Hotel, Philadelphia

Apr. 27-29—Society for Experimental Stress Analysis, spring meeting, Hotel Statler, Los Angeles

May 16-18—Industrial Heating Equipment Association, spring meeting, The Homestead, Hot Springs, Va.

May 16-20—Sixth National Materials Handling Exposition, International Amphitheater, Chicago

May 23-27—American Foundrymen's Society, 59th annual convention, Houston, Tex.

May 31-June 3—Basic Materials Exposition, Convention Hall, Philadelphia

May 22-26—Air Pollution Control Association, 48th annual meeting, Detroit

May 23-25—American Management Association, general management conference, Roosevelt Hotel, New York

June 7-10—American Welding Society, national spring meeting and exposition, Municipal Auditorium, Kansas City, Mo.

June 16-18—Malleable Founders' Society, annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

June 26-28—Alloy Casting Institute, annual meeting, The Homestead, Hot Springs, Va.

June 26-July 1—American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall Hotel, Atlantic City, N. J.

July 12-14—Western Plant Maintenance Show, Pan Pacific Auditorium, Los Angeles

Sept. 6-17—National Machine Tool Builders Association, machine tool show, International Amphitheater, Chicago

Sept. 6-17—Production Engineering Show, Navy Pier, Chicago

Oct. 6-7—National Foundry Association, annual meeting, Edgewater Beach Hotel, Chicago

Oct. 13-15—Foundry Equipment Manufacturers Association, annual meeting, the Greenbrier, White Sulphur Springs, W. Va.

Oct. 16-18—Conveyor Equipment Manufacturers Association, annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

Oct. 17-21—American Society for Metals, national metal exposition and congress, Convention Hall, Philadelphia

Oct. 19-21—Gray Iron Founders' Society, annual meeting, Schroeder Hotel, Milwaukee

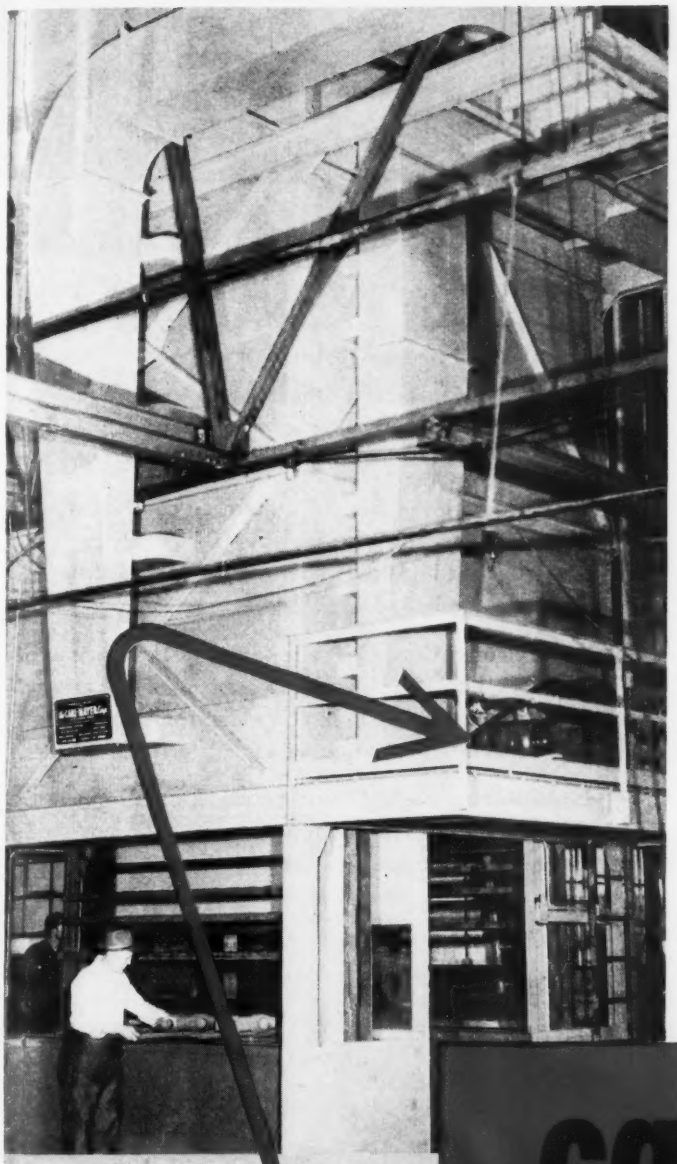
Oct. 20-21—Missouri Valley Regional Foundry Conference, sponsored by St. Louis, Tri-State, and Mo-Kan Chapters of AFS and Missouri School of Mines Student Chapter, at Missouri School of Mines and Metallurgy Rolla, Mo.

Oct. 24-25—Steel Founders' Society of America, fall meeting, The Greenbrier, White Sulphur Springs, W. Va.

Nov. 1-3—Grinding Wheel Institute and Abrasive Grain Association, fall meeting, Statler Hotel, Buffalo

Nov. 14-17—Second International Automation Exposition, Navy Pier, Chicago

Dec. 7-9—American Institute of Mining & Metallurgical Engineers, electric furnace steel conference, Hotel William Penn, Pittsburgh



another carl mayer first

VERTICAL CORE OVEN WITH INTERNAL HEAT FAN

The vertical oven illustrated here is specially designed to give high operating efficiency . . . greater production economy. Location of the heat fan inside the oven (Patent No. 2,628,087) reduces heat loss, lowers installation cost and eliminates smoking.

The recirculating heating system with sealed combustion chamber located between the conveyor chains is an exclusive CARL MAYER feature (Patent No. 2,257,180). This prevents hot combustion gases from going directly into the oven chamber, eliminating non-uniform temperatures and burned cores.

For further details write for our bulletin No. 53-CM . . . or ask for a representative to call.

THE carl mayer CORP.

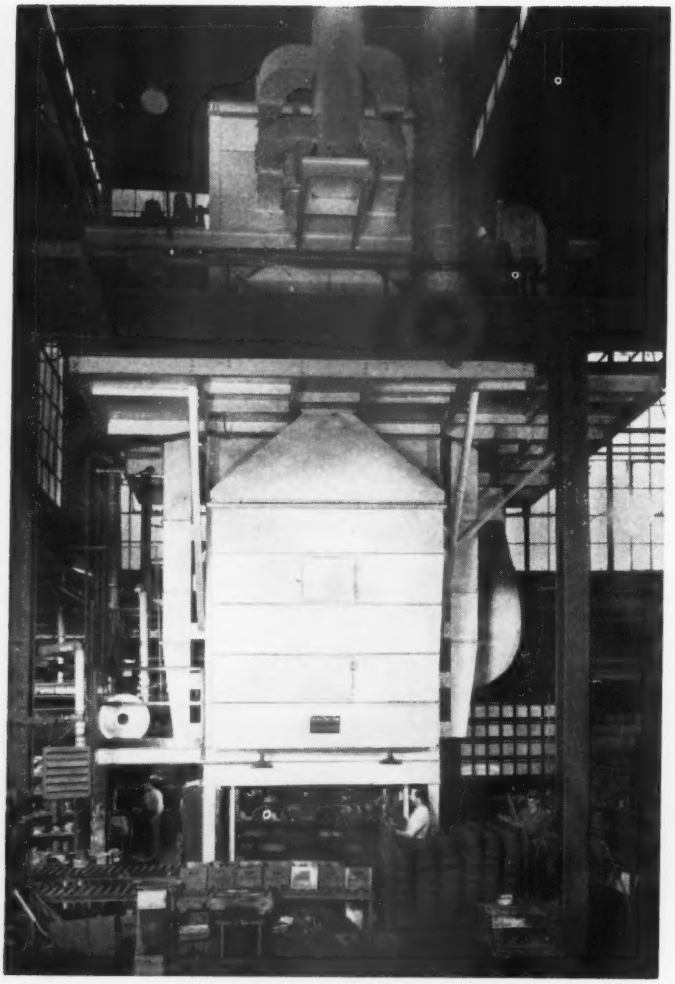
3030 EUCLID AVENUE CLEVELAND 15, OHIO

OTHER PRODUCTS: Heat Treating Ovens and Furnaces • Rod Bakers • Welding Rod Ovens • Paint and Ceramic Drying Ovens • Special Processing Equipment and Accessories

Over 30 years' experience in engineering, designing and installation of industrial ovens and furnaces to both large and small industries everywhere.

Recipient "Trinks" Industrial Heating Award for Outstanding Achievement

LOWER FOUNDRY COSTS BEGIN WITH..



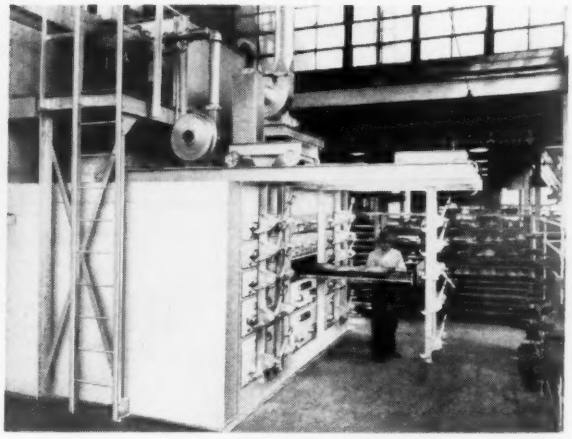
Coleman Tower® Oven

Profitable foundry operations require fast, dependable production of uniformly good cores and molds at lowest over-all cost.

Even with the best of pattern or corebox equipment, machinery, and your skilled labor, your cores and molds will be right only if they are properly baked.

Coleman Core Ovens take the guesswork out of core baking . . . eliminate wasteful rejects and make-overs . . . lower core department costs . . . do your core baking better, faster and cheaper.

Coleman Mold Ovens assure proper drying to make true-to-pattern castings whether molds are to be bone dried or skin dried.

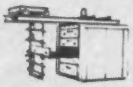


Coleman Rolling Drawer Ovens

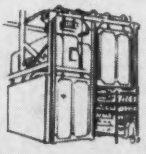
● WRITE FOR BULLETIN 54

Let us recommend the RIGHT type of core and mold oven for your requirements — we make them ALL.

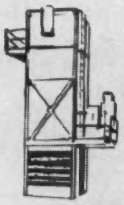
COLEMAN PORTABLE CORE OVENS



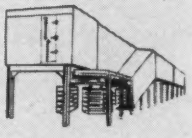
COLEMAN ROLLING DRAWER CORE OVENS



COLEMAN TRANSRACK CORE OVENS



COLEMAN TOWER CORE OVENS



COLEMAN HORIZONTAL CONVEYOR CORE OVENS

COLEMAN OVENS

Only COLEMAN offers a complete line of foundry ovens with all these advantages:

RECIRCULATING AIR OR DIELECTRIC HEATING SYSTEMS to meet your requirement best.

DEPENDABLE BAKING AND DRYING. Coleman Ovens remove all uncertainties in core baking and mold drying. Rejects and make-overs are eliminated.

INCREASED LABOR SAVING. Efficient and modern mechanical designs reduce handling and other indirect labor to a minimum.

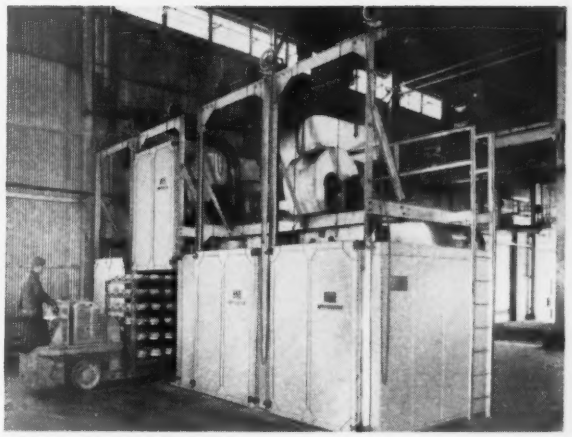
HEAVY DUTY CONSTRUCTION. Responsible for dependable performance, economical operation, and minimum maintenance cost under rugged service requirements.

MAXIMUM FUEL ECONOMY. Coleman Heating Systems use the most economical fuel available to you — gas, oil, stoker-coal, electricity, etc.

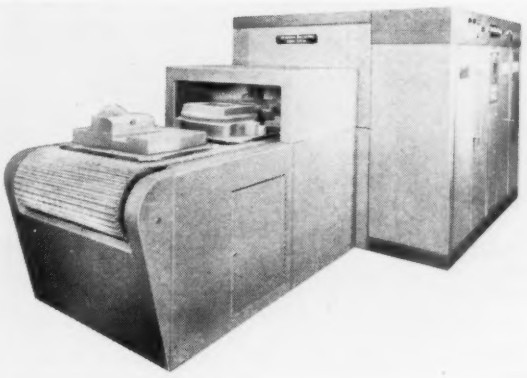
FLEXIBILITY AND ACCURATE CONTROL to bake oil or resin binders—whichever is most satisfactory for your requirements.

BETTER WORKING CONDITIONS. Positive ventilation built into Coleman Ovens prevents leakage of fumes and gases — helps to make the core department a good place to work.

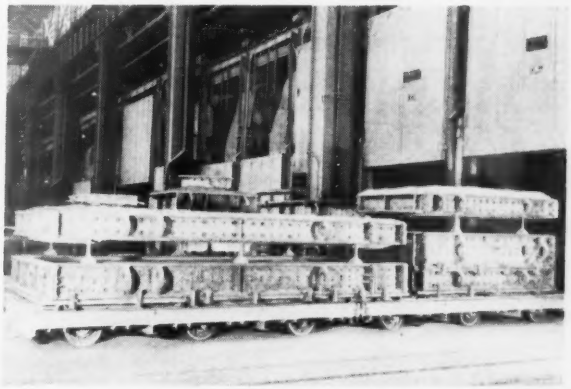
WIDEST EXPERIENCE. Gained through half a century of exclusive specialization in foundry ovens and the building of more than 11,000 successful Coleman Oven installations.



Coleman Transrack Ovens



Coleman Dielectric Oven

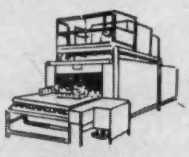


Coleman Car Type Mold Ovens

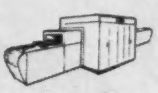
THE FOUNDRY EQUIPMENT COMPANY

1821 Columbus Road • Cleveland 13, Ohio

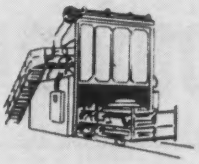
WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS



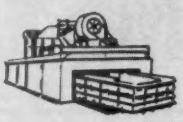
COLEMAN CONVEYOR REDRY OVENS



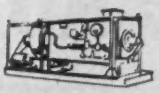
COLEMAN DIELECTRIC CORE OVENS



COLEMAN CAR-TYPE OVENS



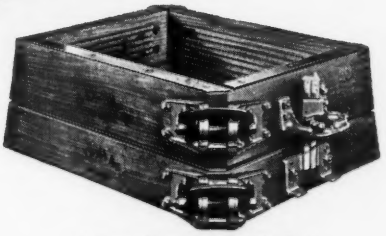
COLEMAN HIGH-SPEED MOLD OVENS



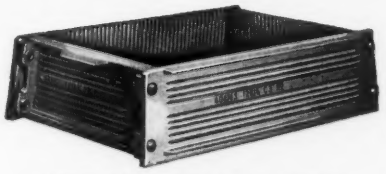
COLEMAN PORTABLE MOLD DRYERS

ADAMS ALUMINUM EASY-OFF FLASK

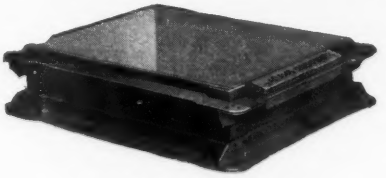
Built for You in Any Length, Width or Depth



Adams Cherry Easy-Off Flask



Adams Jackets, Cast Iron or Aluminum



Adams Steel Jacket

Make real savings from these advantages!

RIGID CONSTRUCTION from our proven corner design, permits less weight with no loss of strength.

SOLID CORNERS are of the same design used on Adams Aluminum Slip Flasks. This interlocking tongue-and-groove construction is retained in perfect alignment with bolts secured through tapped end sections and locked with washers and nuts. Important! This construction has proved far superior to other forms of corner design.

MALLEABLE TRIMMINGS are used on Adams Aluminum Easy-Flasks as on all other flasks we manufacture.

OPERATING MECHANISMS are identical with those used on the Adams Cherry Easy-Off Flask and incorporate the same simple adjustment and reversal of locking position.

STEEL PROTECTING STRIPS are standard equipment at top of cope and bottom of drag. Aluminum strips available upon request at no extra charge.

HANDLES AND TRUNNIONS are available when specified.

Write us today for further details . . .

Cherry Snap Flasks—Cherry Slip Flasks—Aluminum Slip Flasks—Easy-Off Flasks—Cherry Presser Boards—Wood Bottom Boards—Steel Bottom Plates—Steel Jackets—Aluminum or Cast Iron Jackets—Steel Bands—Steel Upsets—Cherry or Aluminum Upsets

The ADAMS Company

ESTABLISHED 1883

MOLDING MACHINES and FLASK EQUIPMENT

700 FOSTER STREET, DUBUQUE, IOWA, U.S.A.

Power! Control!! Production!!!

with Schrader Valves

Compressed air, plus automatic control, has given industry a muscle-saving power to produce more economically . . . without fatigue . . . with increased production.

Reliable valves are an absolute necessity. And **Schrader Valves** are the accepted solution, wherever air controls are used. Schrader Valves are designed and built by a company whose success dates back to 1844—more than a century of experience in air control.

In the complete line of Schrader Valves you'll find two-, three- and four-way models . . . for hand, foot, tripper, cam, pilot or solenoid operation . . . for practically any application.

Compressed air has become a *must* in every plant. If you are not now using it, *investigate* it. And—wherever you actually use compressed air—you'll make its use most effective if you use the best valves possible—Schrader Valves.

Find out how you, too, can put compressed air to work to save you money. For details, write—or, if you prefer, fill out the coupon below.

Schrader

REG. U. S. PAT. OFF.

Leaders in air control since 1844

A. Schrader's Son
Division of Scovill Manufacturing Company, Incorporated
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I am interested in more information on _____

Name_____ Title _____

Company_____

Address_____

(Advertisement)

In foreground, loading heap sand for transportation to magnetic conditioner. In background, delivering facing sand to molders.

Jaeger Auto-Scoops cut handling costs in Darling foundry

. . . move more materials, faster, than loaders previously used

Replacing other loaders of less advanced design, Auto-Scoops handle more materials, with less effort, and get around in the plant more easily, reports Darling Valve & Mfg. Co., Williamsport, Pa. They're worked 18 hours a day on all kinds of sand handling, and also bagged materials, drums, castings, etc. Operators also say they like the Auto-Scoops much better than any loader that they had previously used.

Superior performance is achieved because the Jaeger Auto-Scoop is specially engineered for most efficient scoop loader operation. It moves up to 25% faster, turns in only 6'6" radius with bucket in carry position, dumps over edges to 6'8" high, reaches to 2'7" and easily handles loads to 1200 lbs. — all greater than comparable 12 cu. ft. loaders.

Important advantages are lower bucket tilt-back and lower carry, which insure a full bucket, improved stability and faster travel. The operator can move into material and retract the bucket independently of hoisting, repeatedly if necessary, at ground level. He can load stubborn materials without excessive traction crowding, and can actually flip the load into the bucket when loading from small stockpiles and windrows. Boom arms and bucket are under finger-tip hydraulic control.

These are only a few of its features that contribute to overall gains in production. For more data and specifications, write for Catalog L12-4 and name of nearest distributor. The Jaeger Machine Co. 502 Dublin Avenue, Columbus 16, Ohio

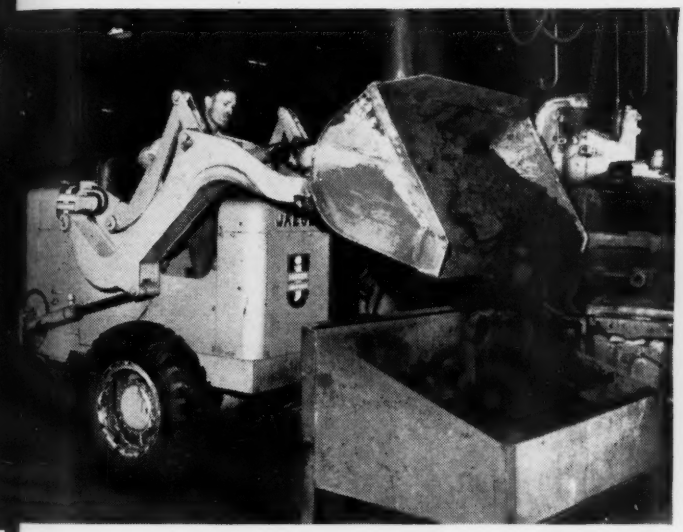
JAEGER LOAD-PLUS
auto-scoop

1 cu. yd. Load-Plus available for bigger work

Air Compressors • Pumps • Mixers • Paving Machines
Distributors throughout U.S. and
Canada and Principal Cities of the World

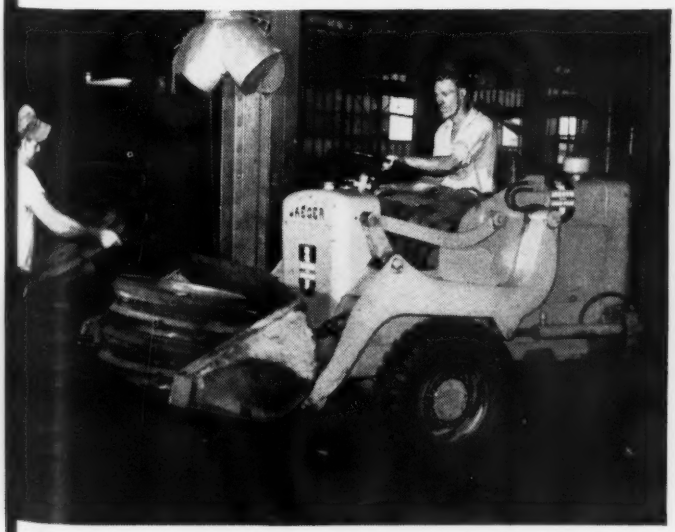
Dumping heap sand into magnetic conditioner. The fast-loading, fast-traveling, fast-discharging Auto-Scoop moves more loads per hour. Short turning radius, rear wheel steering help speed the job, facilitate work in tight places.

A load of facing sand on its way to a molder. Here the runway is defined by banks of prepared molds. Compact design of the Jaeger Auto-Scoop simplifies work in narrow aisles, makes operation easy in cramped quarters.



Unloading facing sand into hopper at molding machine. Simple controls and full visibility enable the operator to spot load accurately, dump fast or slow as needed, discharge partial loads. Single 4-way valve controls both boom arm and bucket.

Besides bulk handling, Jaeger Auto-Scoops come in handy for doing many other jobs such as handling bagged materials, boxes, scrap. Big lifting capacity and large bucket enable the Auto-Scoop to haul maximum loads.



The Auto-Scoops are also used for transporting flasks and castings. An unusual additional application is to hoist maintenance workers to overhead lighting fixtures. Saves manhours, increases production all around the plant.

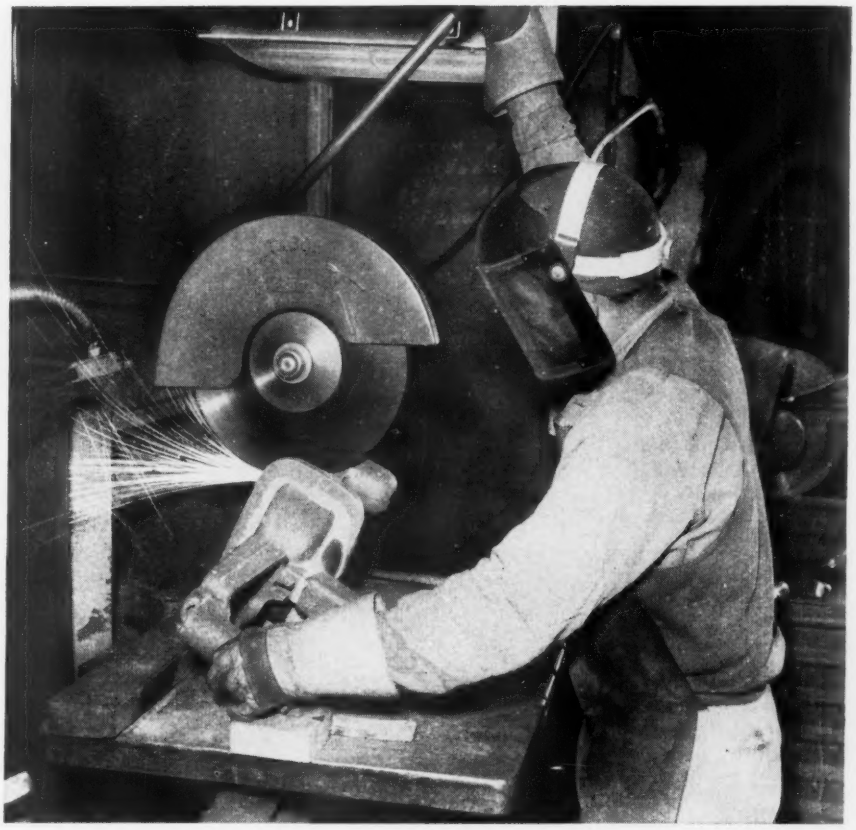
Hoisting and stacking drums shows further versatility. 55" wide bucket and full 45° bucket angle when in dumping position (both greater than other loaders) simplify this operation. Special buckets available, also fork lift attachment.

HOW TO BUY CUT-OFF WHEELS

FOR FASTER, SAFER FOUNDRY CUTTING

. . . and get "More Use per Dollar"

Look for a wheel specially designed to take the abuse and excessive strain of heavy cutting on castings without wheel breakage. Safe, fast, efficient cutting of gates and risers on castings is a frequent foundry problem. The high cutting ability of conventional abrasive cut-off wheels is offset by their failure to withstand operational distortion and side-strain in cleaning-room operations. Good operational practice, of course, requires a steady, straight feed to make a clean cut without undue side-strain or possible shattering of the wheel. Correct mechanical reinforcement *built-in* the wheel, however, can give a degree of added protection against these operational hazards that will virtually eliminate such wheel failures . . . increase cutting efficiency and cleaning-room production. Specify the abrasive cut-off wheel reinforced for foundry operating conditions . . . specify Manhattan Reinforced Foundry Cut-Off Wheels.



MANHATTAN REINFORCED CUT-OFF WHEELS

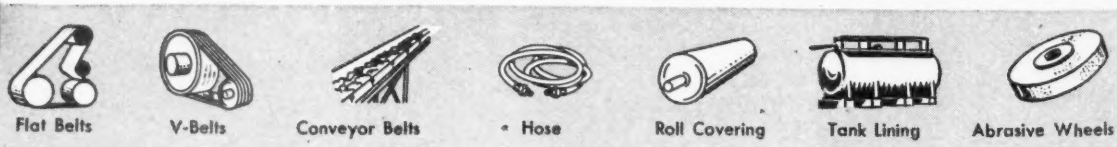
These cut-off wheels are reinforced two ways. Special fibers in the bond increase by 50% the strength to withstand destruction by centrifugal force. Special industrial fabric lateral reinforcement enables Manhattan Reinforced Cut-Off Wheels to perform under adverse conditions of side-strain far beyond the endurance of conventional cut-off wheels. In addition, actual field reports indicate up to 25% higher cleaning-room production with these wheels on both stationary and swing-frame cut-off machines. Ask your Manhattan representative to show you how to get faster, safer cutting and increased production . . . "More Use per Dollar" . . . with Manhattan Reinforced Foundry Cut-Off Wheels and other types of high speed, heavy duty wheels.

RM 528-F

WRITE TO ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.



Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings
Asbestos Textiles • Packings • Engineered Plastic, and Sintered Metal Products • Bowling Balls

PROFIT
Pictures

Thin, high-strength shell walls bonded with Resinox save man-hours, shop space and money.

Picture of a man cutting costs 30%

In most casting jobs, the two critical factors are quality and cost. "But when you're casting aircraft parts, which is our specialty," says Earl Donelan, Superintendent of Thompson Product's Kolcast Division in Cleveland, "you don't tamper with quality. It's cost that gets the double squeeze.

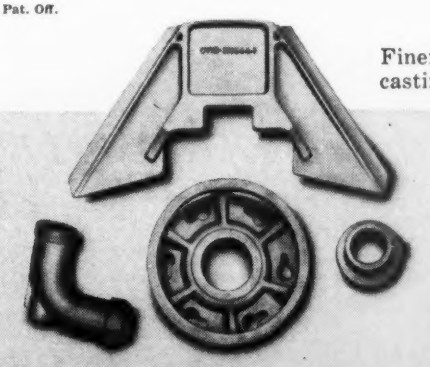
"Shell molding, using Monsanto's *Resinox** resins, has enabled us to reduce weight of castings, increase sectional changes in the part, cut finishing costs, maintain closer tolerances, cast thinner walls, reduce mismatching and core-shift by 50%, and lower our final customer cost by more than 30%."

Mr. Donelan is also sold on Monsanto's technical service. He explains it this way:

"When we first thought of shell molding back in 1951, we turned to Monsanto. They literally moved in and lived with our problems. They rolled up their sleeves and worked out kinks in sand and core mixtures until we had what we wanted. Monsanto's customer service, like Monsanto resins, is second to none."

For research-developed and shop-tested resins to meet *your* foundry needs, for shell molding, core binding or sand conditioning, write first to Monsanto Chemical Company, Plastics Division, Springfield 2, Mass.

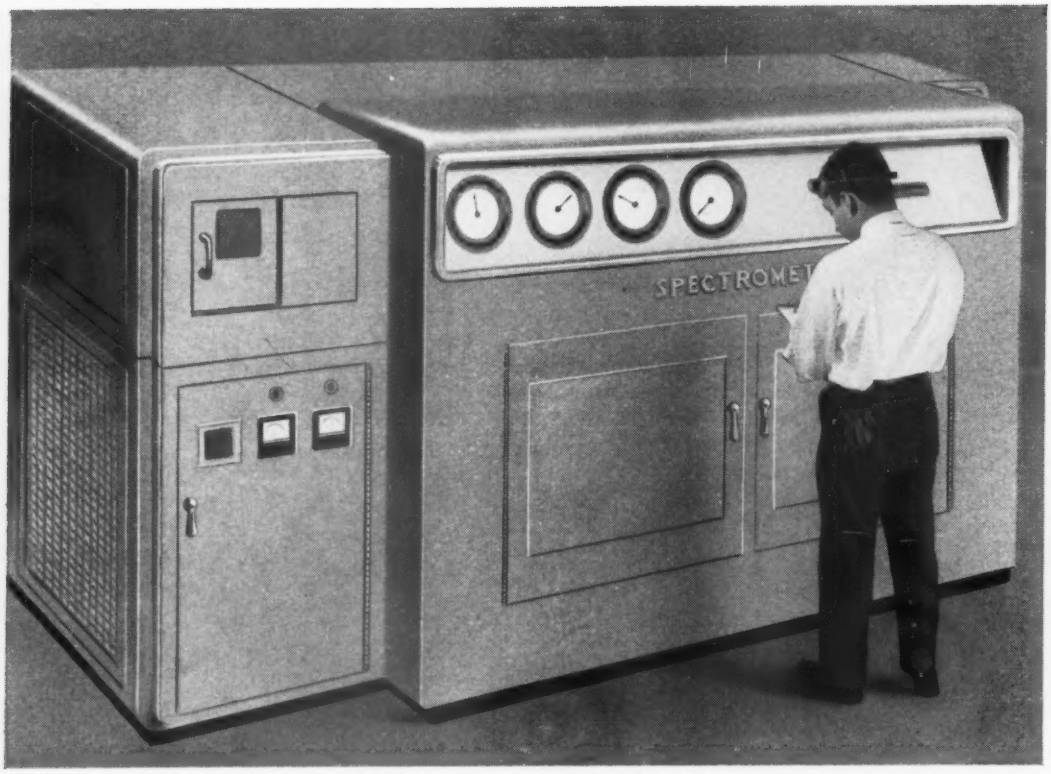
*Reg. U.S. Pat. Off.



Finer surface finish, fewer rejects, closer tolerances are results of casting with shell molds bonded with Monsanto quality Resinox resin.

MONSANTO

RESINOX®



Baird Associates Presents...

Quality Control On The Production Floor

With the new Baird Spectromet*, spectrochemical analysis is possible directly on the floor of the foundry and in the meltshop. Thirty to forty seconds after the sample is burned, the concentrations of six elements in the sample are read from indicators located on the face of Spectromet*. The indicator readings can be easily and rapidly translated into accurate corrections in the melt and give constant control of the contents of the melt.

The speed of the instrument's operation permits as many as 180 determinations per hour providing practical analytical data at low cost per sample. Sealed optical and electronic compartments provide a built-in laboratory environment. Maintenance is reduced to a minimum.

For more information why Spectromet* can help serve your analytical needs, write for free technical Bulletin #42.

Visit Booth 25, 26, 27
Pittsburgh Analytical Exposition
March 1-4, 1955

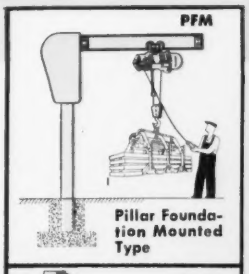
Baird Associates, Inc.

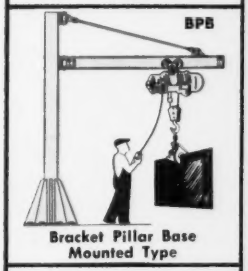
*Registered Trade Mark

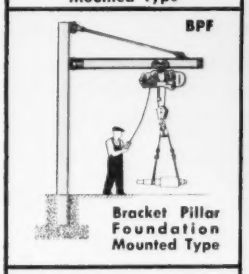
33 University Road · Cambridge 38, Mass.

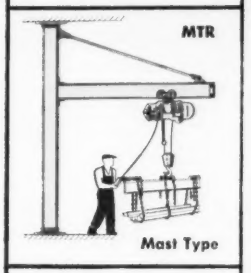
Industrial HEAVY DUTY JIB CRANES

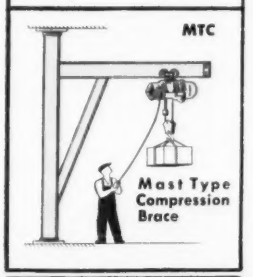
Precision Engineered and built for smooth efficient operation

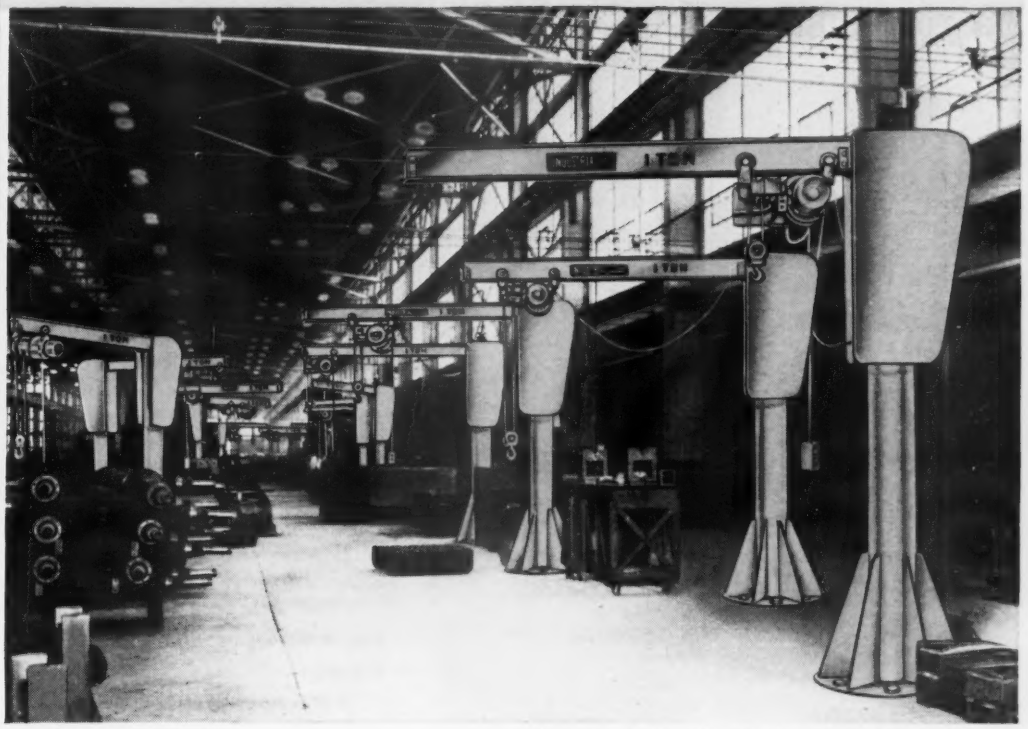












PBM Pillar Base Mounted Type

The most "copied" Jib Crane in Industry

Industrial PBM self-supported Jib Cranes are of all welded steel construction, rotate 360 degrees and have capacities up to 12,000 lbs. The rotating steel head revolves on 4 rollers and 9 precision ball bearings resulting in extremely smooth operation — unsurpassed by any other crane of its type. The high standard of workmanship and material, coupled with reliable performance make Industrial Jib Cranes your best buy.

Industrial manufactures 6 other types of Jibs and many models of Overhead Traveling Cranes to cover every need. Consult with Industrial for cranes to solve your material handling problems.

Industrial CRANES ®

INDUSTRIAL CRANE & HOIST CORPORATION

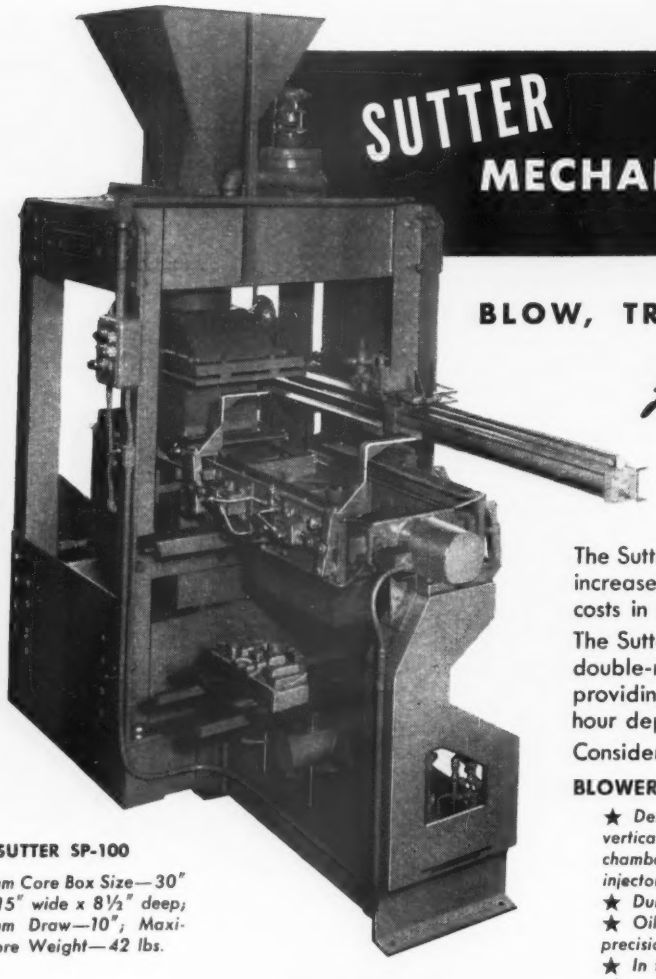
1541 SOUTH PAULINA STREET **CHICAGO 8, ILLINOIS**

Overhead Cranes • Jib Cranes • Monorail Systems • Crane Runways
Representatives in Principal Cities

J1254C

TOP CORE PRODUCTION

at a NEW, LOW COST!



SUTTER SP-100

Maximum Core Box Size—30" long x 15" wide x 8½" deep; Maximum Draw—10"; Maximum Core Weight—42 lbs.

SUTTER MECHANICORE Jr.

BLOW, TRANSFER, ROLLOVER and DRAW *Automatically*

If price is the reason that you have not changed to automatic core making, then you can now realize the many benefits from this new foundry automation. The Sutter Mechanicore Jr. was developed specifically to provide increased core production, improved quality and greatly reduced costs in a unit that is priced within the range of every foundry.

The Sutter SP-100 consists of a single head blower, an automatic double-rollover draw unit and an automatic transfer device . . . providing up to 220 cycles per hour. The number of cores per hour depends on the core box cavities.

Consider these features . . .

BLOWER

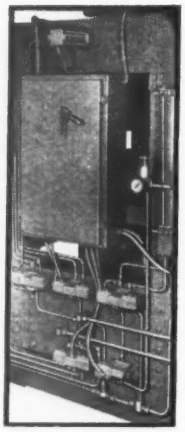
★ *Designed for dependable, long-life operation, the blower head moves vertically on hardened keys and oversize, long-bearing guide shafts.* ★ *Sand chamber is stationary.* ★ *Center fill assures precision alignment.* ★ *Twin injectors from one large blow valve provide positive, instantaneous blowing.* ★ *During the blow cycle, high pressure oil securely locks the unit in position.* ★ *Oil-operated cylinder on the oil-operated squeeze table guarantees a precision draw, smooth operation and reduces the required air consumption.* ★ *In fact, there is a 30% saving in the total air consumption, a total saving of many dollars.*

If desired, the blower unit is available separately.

AUTOMATIC DOUBLE ROLLOVER CORE DRAW UNIT AND AUTOMATIC POWER TRANSFER DEVICE

★ *Proven in years of service in foundries throughout the world these units give long, reliable service.* ★ *This draw unit features a centrally located vibrator for a positive, precision draw every time.* ★ *Draw table is adjustable for the most convenient positioning of the drawn cores.* ★ *An automatic pushout and elevating attachment is available which saves time and reduces fatigue.* ★ *The transfer device automatically moves the core boxes to and from the blower.* ★ *Core box is mounted on a transfer car which travels on V-type tracks. This assures positive alignment and permits the core box to be changed in minutes instead of hours.*

Operation is pushbutton controlled, automatic or manual operation. Standard electrical components and manifold-mount valves are used throughout. All are positioned for easy accessibility.



Economical to purchase, economical to operate—this new Sutter SP-100 is the answer for foundries that want top production of high quality cores at low cost. Technical bulletin No. SP-100 gives complete data. Send for your free copy today.

SUTTER

Exclusive United States Sales Representative:
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Exclusive Canadian and Overseas Manufacturer and Distributor:
FOUNDRY EQUIPMENT LTD.
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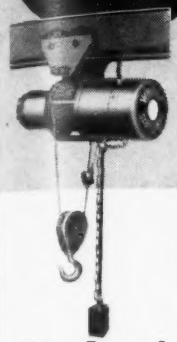
PRODUCTS COMPANY

Creators of foundry equipment with NEW productivity

2005 WESTWOOD AVE. • DEARBORN, MICHIGAN

ACCO products

Why WRIGHT *Speedway* Hoists Merit Full Confidence of Both Production and Maintenance Men

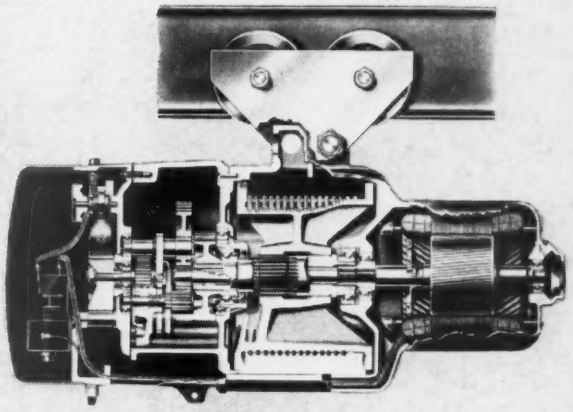


Wright Frame 1 Speedway ¼ to 1-ton

It's a heavy-duty workhorse for Production Men...

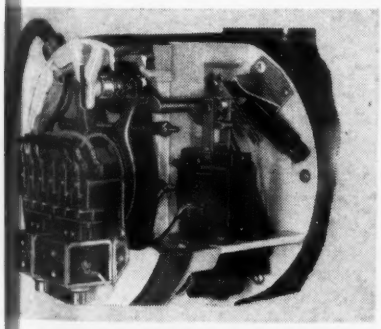
because of sound, generous and practical design of all components, plus standard NEMA specification totally enclosed motors. Heavy-duty design and fine balance give users definite assurance that 1954 Model WRIGHT *Speedway* Frame 1 Hoists will handle tough jobs on any duty cycle for which 1½ H.P., 30-minute NEMA motors are satisfactory. We guarantee this.

A New Booklet, #**DH-133B,** tells the full story of the many fully-tested structural, electrical and mechanical features that make WRIGHT Frame 1 *Speedways* ideal for production materials handling work. Write our York, Pa., office for your copy of this book that is pictured below.

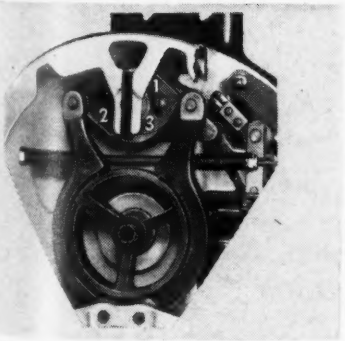


The ideal hoist for production work

It's the easiest hoist for Maintenance Men to service...



Easiest to get at



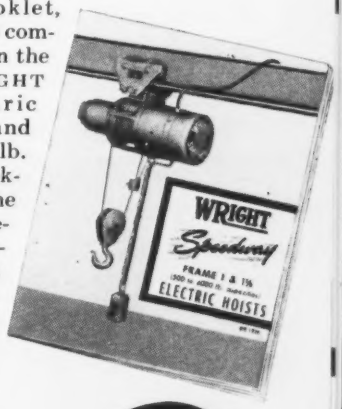
Nothing to adjust but the cam!

because those components that are most likely to need service or adjustment—on any hoist—are fully accessible when the end housing and side cover are removed as shown in the picture at the left. Removal of housing and cover is a simple matter of loosening or removing a few screws.

To compensate for brake lining wear on the motor brake on these 1954 Model WRIGHT *Speedways*, there is nothing to adjust but the cam. This adjustment is literally "as simple as ABC." Cam settings are pre-determined and numbered. There is no guess work. The long, calibrated compression springs and the solenoid are factory-set...they NEVER need adjustment for brake lining wear.

Write for this New Booklet

Write our York, Pa., office for this New Booklet, #DH 133B. It gives complete information on the 1954 Model WRIGHT *Speedway* Electric Hoists, Frame 1 and 1½ (500 to 4000 lb. capacities). The booklet fully describes the many electrical, mechanical and structural features that make these WRIGHT Hoists ideal for production and maintenance men.



ACCO

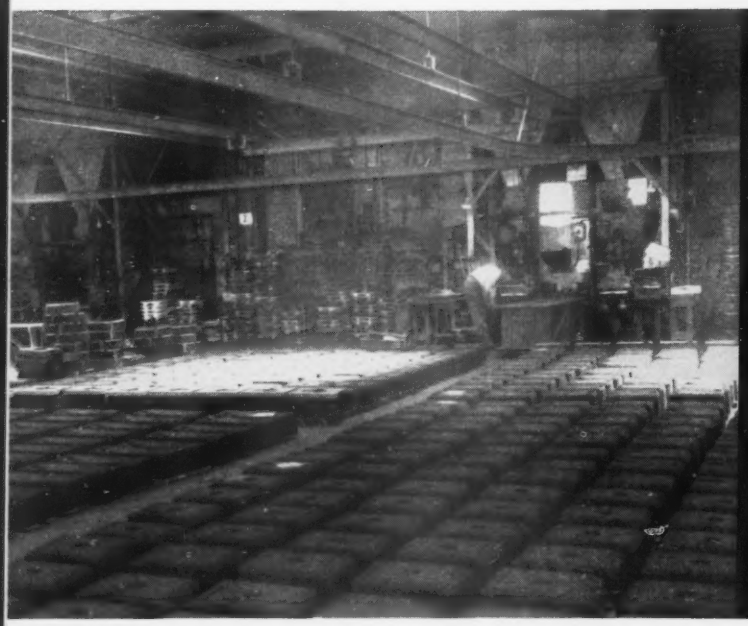
TRADE MARK

Wright Hoist Division
AMERICAN CHAIN & CABLE

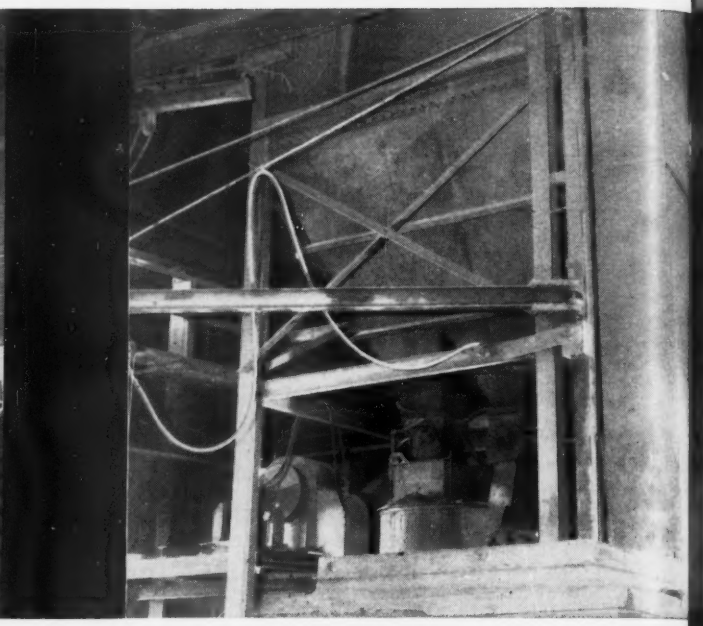
York, Pa., Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

Hoists
Trolleys
Cranes

NEWAYGO helps expanding



Otaco, Ltd. The twin Handy Sandy units in their second year of operation "replaced 12 individual mold-making machines, yet give the same output—a ratio of 3 to 1 increase in efficiency. One twin Handy Sandy unit concentrates on molds for nodular iron castings, while the other unit handles mostly molds for grey iron castings." Sand is loaded into storage bins behind the Handy Sandy units by a Payloader. Portable roller conveyors are used for speedy transference of molds to the floor area. Photo shows a portion of the molds obtained in one day's run. Otaco, Ltd. is getting from 300 to 450 molds per day from each man.



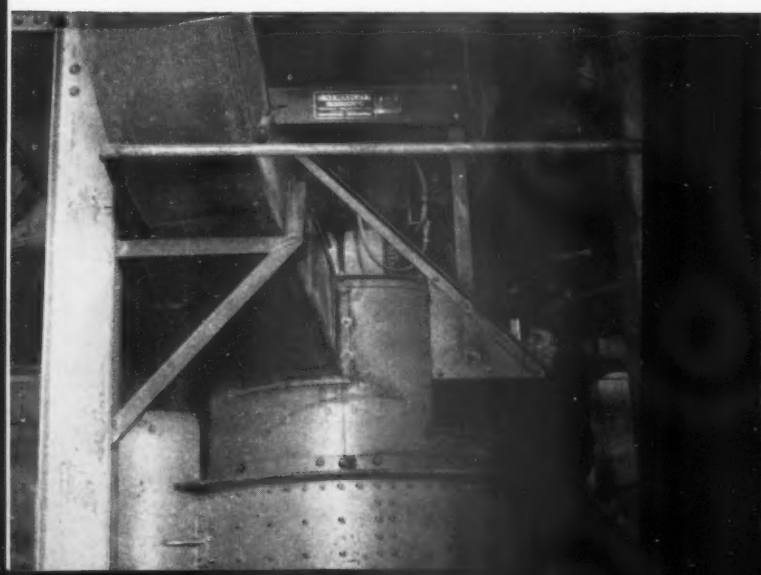
Canadian Electric Castings, Ltd. Here a shown the vibrating shake-out, elevator and double sand stora bin which are part of a complete Newaygo Sand Handling an Conditioning Unit. One part of the two-compartment storag bin is for used sand, and the other part is for new sand. Th used sand is charged into a mullor through an air operated gat The new sand is measured into a mullor through a Newayg operated Rotary Vane Feeder. The sand, after being proper mixed in the mullor, is delivered to molding stations.

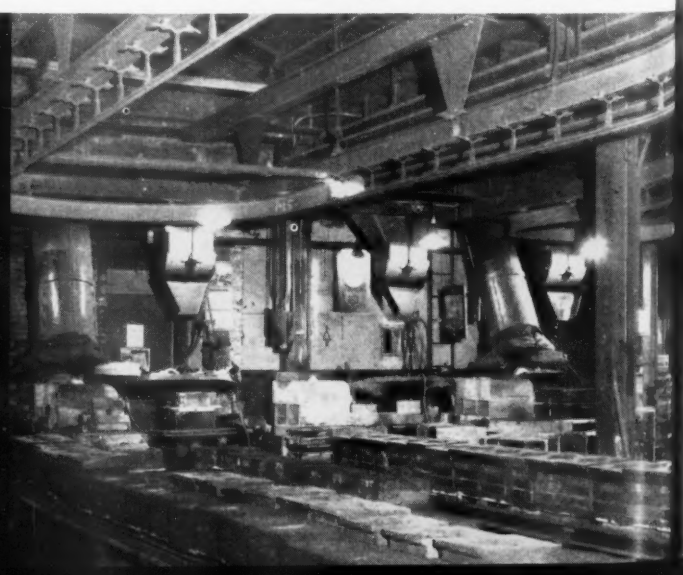
3 out of 5 foundries in Orillia, Ontario use Newaygo Sand Handling equipment

Fahralloy Canada, Ltd. These two photographs show the installation of component parts of the Newaygo Sand Handling and Conditioning equipment in the foundry of Fahralloy Canada, Ltd.

The photograph on the left shows the Newaygo Traveling Weighlarry, which is an important part of the overhead sand system since it provides accurately weighed batches of sand to the mullor.

The photograph at the right shows the five overhead Newaygo Molding sand hoppers which operate with airgates, also designed and fabricated by Newaygo as part of the overhead system.





foundry programs in CANADA

NEWAYGO ALSO SERVES THESE FOUNDRIES IN THE HEART OF INDUSTRIAL CANADA:

LBERTA	
rane Limited	1 Handy Sandy, 1 Reddy Sandy
oothills Steel Fdry. & Iron Works, Ltd.	1 Handy Sandy
RITISH COLUMBIA	
ajor Aluminum Products, Ltd.	1 Reddy Sandy
ANITOBA	
anitoba Steel Foundries, Ltd.	1 Handy Sandy
onarch Machinery Co., Ltd.	1 Handy Sandy
UEBEC	
he Robert Mitchell Co., Ltd.	2 Handy Sandys
olcano, Ltd.	1 Reddy Sandy

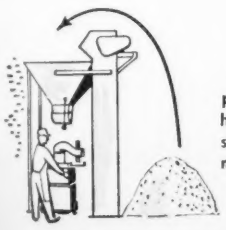
ONTARIO	
Algoma Steel Corp., Ltd.	2 Handy Sandys
Beatty Bros., Ltd. (Fergus)	1 Handy Sandy
Beatty Bros., Ltd. (Penetanguishene)	2 Handy Sandys
Burndy Canada, Ltd.	1 Handy Sandy
Canadian Brass Co., Ltd.	1 Handy Sandy, 1 Reddy Sandy
J. F. Cunningham & Son, Ltd.	1 Handy Sandy
Ontario Malleable Iron Co., Ltd.	4 Handy Sandys
Prescott Brass Mfg. Co., Ltd.	1 Handy Sandy, 1 Reddy Sandy
A. H. Tallman Bronze Co., Ltd.	1 Handy Sandy
J. A. Wotherspoon & Son, Ltd.	1 Super Handy Sandy
Bell City Foundry	1 Handy Sandy
Yale & Towne Mfg. Co.	2 Handy Sandys, 1 Reddy Sandy
Benn Iron Foundry, Ltd.	2 Handy Sandys

THE FOLLOWING HAVE INSTALLED OR ARE IN THE PROCESS OF INSTALLING NEWAYGO SAND HANDLING EQUIPMENT:

ALBERTA
Riverside Iron & Engineering Works, Ltd.

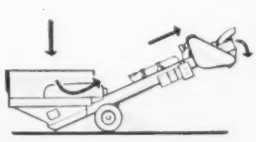
ONTARIO
Canada Iron Foundries, Ltd.
Port Hope Sanitary Mfg. Co., Ltd.
Neptune Meters, Ltd.
Ford Motor Co. of Canada, Ltd.
J. A. Wotherspoon & Son, Ltd.
Standard Sanitary & Dominion Radiator, Ltd.

Reports from foundries with installations of Newaygo equipment show an average increased production of 59.6%, the lowest being 20% and the highest 300%. Man hours saved average 44%, the lowest being 13% and the highest 80%. Free engineering layouts, service and estimates by practical engineers—single contract efficiency with one company responsible for fabrication, installation, erection and final inspection—a complete staff of service engineers on 24-hour call—plus a 40-year record of proved ability in the foundry field—all these factors assure production increases and man-hour savings that will pay for mechanization, and step up profits.

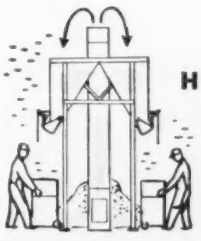


HANDY SANDY
puts sand overhead, eliminating shoveling for the molder.

REDDY SANDY



takes the hard work out of shakeout and sand preparation.



SUPER HANDY SANDY
a high capacity individual-floor sand handling unit.

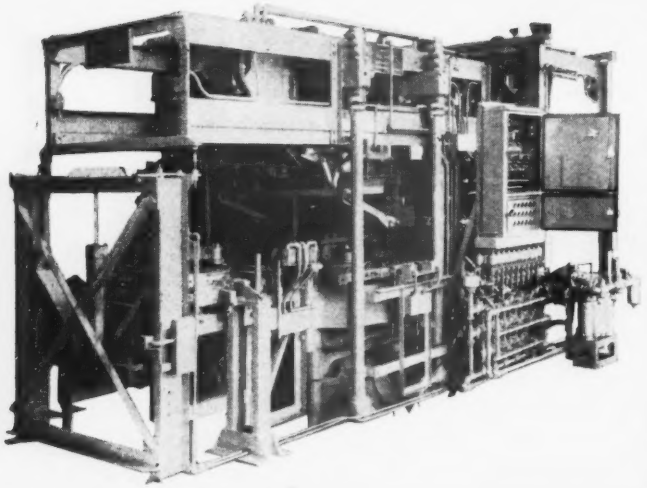
A copy of "Planned Mechanization for Foundries" is yours for the asking. Write, wire, or phone today.

NEWAYGO

Manufacturers of Neway® Mold Handling, Sand Handling and Conditioning Equipment

Don Barnes Foundry Supplies & Equipment • Hamilton, Ontario
605 James St., North Phone Jackson 7-7436
Canadian representative for Provinces of Manitoba and Ontario, east to Kingston

Newman Foundry Supply Company • St. Lambert, Montreal 23, Quebec
665 Pine Ave., P. O. Box 160 Phone Orchard 1-1926
Canadian representative for Provinces of Ontario and Quebec east of Kingston; New Brunswick, and Nova Scotia and Prince Edward Island



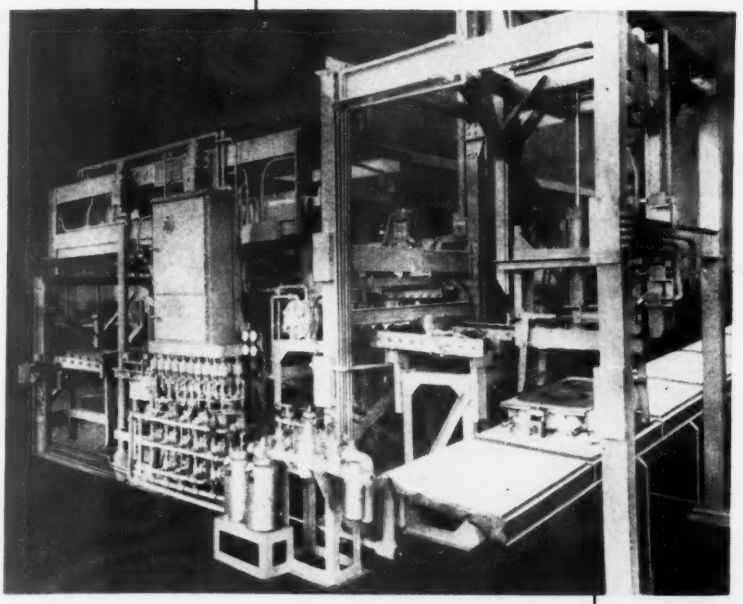
SHOWS FLASK ON FEED-IN ELEVATOR

"Push-Button" Operation Means The Ultimate in

INCREASED PRODUCTION . . .

ECONOMY . . .

QUALITY MOLDS



SHOWS COMPLETED MOLD AFTER BEING TURNED OVER, AUTOMATICALLY TRANSFERRED TO MOLD CONVEYOR

Every Nicholls Molding Machine is precision-built to insure the production of *continuously* better molds. They eliminate guess-work and costly mistakes. They put an end to dangerous risks. They effect major savings in materials and maintenance costs.

This new #24 type C machine has a pneumatic pattern draw, is equipped with an air-operated car type squeeze head, built-in flask roll-in, roll-out device and a measuring sand hopper. Other Nicholls advantages include a flask indexing device and sand spill upset; flask feed-in elevator; mold turnover and transfer... PLUS full "push-button" automatic operation.

William H. Nicholls Co., Inc., Richmond Hill 18, Long Island, N. Y.

Always rely on "Nicholls" for the best in heavy-duty molding machines

NICHOLLS

ROTOBLAST BLASTMASTER® BARREL. Mathews Heat Treating Co., Newark, N.J., saved $8,000 on one contract alone by using the Pangborn Blastmaster Barrel with Rotoblast.

wherever blast cleaning

ROTOBLAST TABLE-ROOM. Utica General Jobbing Foundry, Utica, N.Y., saves $1,200 a year in labor alone with Pangborn Rotoblast Table-Room.

Pangborn

BLAST CLEANS CHEAPER

Rotoblast Blastmaster & Continuous-Flo Barrel

Rotoblast Tables & Table-Rooms

Special Blast Rooms & Cabinets

Pangborn Dust Control Equipment

Malleabrasive* Shot & Grit

Look for Pangborn Rotoblast®

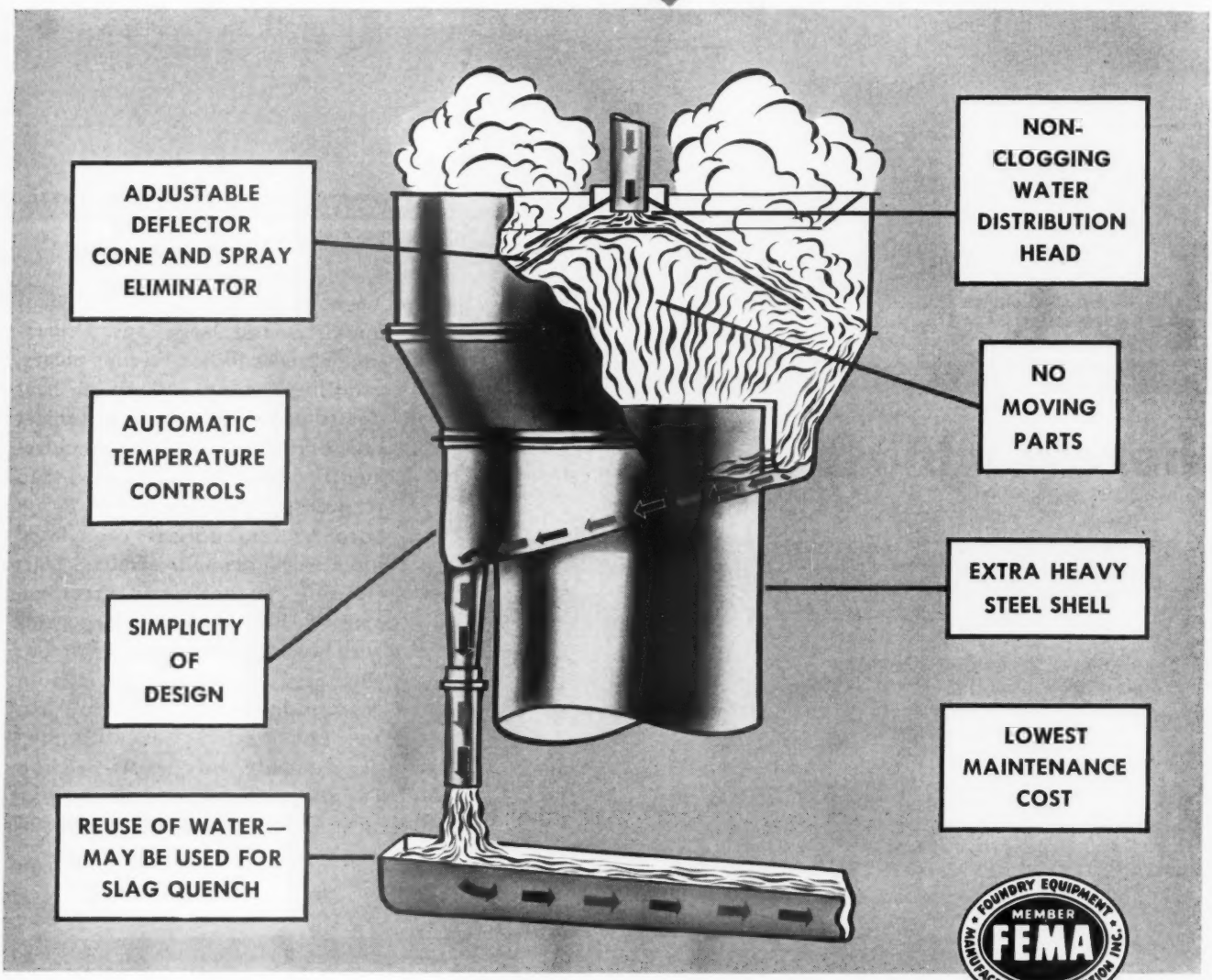
Throughout the country—in small foundries and large ones, cleaning ferrous and non-ferrous pieces, handling castings, forgings, heat treated parts—Pangborn Rotoblast cuts operating costs for foundrymen. But Rotoblast offers more than versatility. This exclusive Pangborn process utilizes centrifugal force for thorough, efficient blast cleaning . . . throwing a great volume of abrasive over a large area with heavy density. It eliminates air compressor investment, saves labor costs, requires less power to operate. The result is *better* cleaning done quickly and cheaply. See how Pangborn Rotoblast can cut blast cleaning costs and save *you* money!

is done faster and cheaper

For faster, cheaper cleaning, investigate Pangborn Rotoblast now. Write today for Bulletin 214 to: PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Md.

*U. S. Patent 2184926 (other patents pending)

What to look for in the cupola collector you may buy!



Here you can see the simplicity of the Schneible Cupola Collector, type "SW".

The success of this collector is the result of scores of years of research and far-sighted planning to provide equipment to meet today's demands for simple, efficient fly-ash control in our modern foundries. This collector also conforms to most codes throughout the country.

For simplicity and efficiency of operation the "SW" Cupola Collector has no equal. Schneible patented features assure the lowest possible maintenance cost and a longer, more useful life.

It will pay you to check with your local Schneible representative or, if you like, call us collect at the main office.

CLAUDE B. SCHNEIBLE COMPANY
P. O. Box 81, North End Station • Detroit 2, Michigan

Cable Address: CBSCO
European Licensee: Elex S. A., Zurich, Switzerland

SCHNEIBLE

Write for Bulletin 554
without obligation

LATE NEWS

JANUARY 24 1955

AFS NOMINATES: Bruce L. Simpson, president, National Engineering Co., Chicago, has been nominated for presidency of the American Foundrymen's Society, subject to election at the annual meeting in Houston this May. Mr. Simpson, currently vice president, will succeed Frank J. Dost, president, Sterling Foundry Co., Wellington, O. Nominee for vice president is Frank W. Shipley, foundry manager, Caterpillar Tractor Co., Peoria, Ill.

Named for three-year directorships are: C. W. Gilchrist, foundry superintendent, Cooper-Bessemer Corp., Mt. Vernon, O.; Charles E. Nelson, technical director, Magnesium Division, Dow Chemical Co., Midland, Mich.; O. Jay Myers, technical director, Foundry Products Division, Archer-Daniels-Midland Co., Minneapolis; Richard A. Oster, director, Beloit Vocational and Adult School, Beloit, Wis.; Curtis C. Drake, plant superintendent, Griffin Wheel Co., Denver; Robert W. Trimble, foundry superintendent, Bethlehem Supply Co., Tulsa, Okla.

SHELL MOLDING: Shell Castings Inc. is the name of a group of foundries which are pooling their facilities to produce shell mold castings in ferrous and nonferrous metals. Address of the group is Box 782, Erie, Pa. . . . Polygram Shell Mould Co. Ltd. of England says that its 12 licensees in South Africa make the percentage (7.6%) of foundries operating the shell molding process higher there than in any other country in the world . . . Shalco Engineering Corp. has shipped the first American-designed shell molding machine to Germany, home of the shell molding process.

ACQUIRES INTEREST: Akron Standard Mold Co., Akron, O., has acquired a financial interest in James C. Heintz Co., Cleveland. The Akron firm produces molds for mechanical rubber goods, tires, tire building drums and other types of rubber processing machinery. Heintz Co. manufactures retreading equipment and aluminum new-tire mold inserts. It will operate without any change in management, personnel or policies, but will be able to use the facilities of Lectromelt Casting Division of Akron Standard Mold for its iron and steel castings. Akron Standard, in turn, will be able to furnish complete tire molds with precision cast matrices or inserts using the Heintz Monotread method of casting.

BUYS FOUNDRY: Pelton Steel Casting Co., Milwaukee, has bought the stainless steel foundry of Solar Aircraft Co. at San Diego, Calif. Purchase was made through a new subsidiary, Pacific Alloy Engineering Corp. The foundry is being moved from San Diego to nearby El Cajon, Calif. Allen M. Slichter, Pelton's president, is also president of the new concern. Walter H. Dunn, head of Solar foundry operations, is vice president.

FEF MEETING: Eighth annual College-Industry Conference of the Foundry Educational Foundation will be held at Hotel Cleveland, Cleveland, Mar. 9-10. A large part of the program will consist of discussion of educational activities at FEF schools. A panel of industry members will discuss "Sales and Market Aspects of Engineering Education in Cast Metals." The annual banquet will have Dr. T. Keith Glennan, president, Case Institute of Technology as principal speaker.

CAPACITY OPEN: Capacity for producing most iron and steel products in quantities estimated to be needed under full mobilization has been provided under the government-sponsored expansion program. According to the BDSA Iron and Steel Division, however, capacity goals have yet to be reached for steel castings and heavy gray iron castings (3000 pounds and over), in addition to a few rolled steel items.

MERGERS: Hooker Electrochemical Co., Niagara Falls, N. Y. is negotiating for a merger with Durez Plastics & Chemicals Inc., North Tonawanda, N. Y. The latter is expected to be operated as a division of Hooker but retain the Durez name . . . American Steel Foundries has bought all the outstanding stock of Pipe Line Service Corp., Franklin Park, Ill.

The latter, which will operate as a subsidiary of American, coats and wraps steel pipe to prolong its life.

GOOD MANAGEMENT: Among 13 metal companies awarded certificates of "management excellence" for 1954 in the sixth annual management survey by the American Institute of Management are these foundries: Dayton Malleable Iron Co., Dayton, O.; Lynchburg Foundry Co., Lynchburg, Va.; and United Engineering & Foundry Co., Pittsburgh.

PERSONALS: J. F. Wallace, recently with Watertown Arsenal, Watertown, Mass., has been appointed associate professor of metallurgical engineering at Case Institute of Technology, Cleveland . . . John Slezak has resigned as undersecretary of the Army to return to the Turner Brass Works, Sycamore, Ill., of which he is president . . . R. D. Hill, recently executive vice president, has been elected president of Taylor-Wharton Iron & Steel Co., High Bridge, N. J. . . . Richard Doughton Jr., staff metallurgist for the Materials Advisory Board of the National Academy of Sciences, Washington, has been appointed development engineer in the Product Development Division, Jones & Laughlin Steel Corp., Pittsburgh . . . A. J. Fruchtl, resident manager, United States Pipe & Foundry Co., Birmingham, has been appointed to the administrative council of the National Foundry Association, replacing J. S. Bridges of the same company . . . Richard W. Krieg, foundry sales engineer for Crucible Steel Casting Co., Milwaukee since 1948, has been made sales manager, succeeding the late John E. Schaible.

MISCELLANY: Lehigh Foundries Inc., Easton, Pa., has changed its name to Lehigh Inc. . . . Foundry Equipment Manufacturers Association will hold a spring meeting at the Sheraton-Carlton Hotel, Washington, Apr. 15 . . . American Steel Foundries has designed a new brake rigging for use on railroad passenger cars with the newly developed high-friction composition shoe . . . December price index of foundry and forge shop products was 129.4, unchanged from November and comparing with 129.3 a year ago, according to the Bureau of Labor Statistics, U. S. Department of Labor.

PRICES OF FOUNDRY METALS AND COKE

(As of Jan. 24, 1955)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE	
Connellsville	$16.50–17.00
OVEN	
Birmingham	$22.65
Buffalo	25.00
Chicago	24.50
Detroit	25.50
Erie, Pa.	25.00
Everett, Mass.	23.50
Indianapolis	24.25
Kearny, N. J.	24.00
Lone Star, Tex.	18.50
Milwaukee	25.25
Montreal, Que.	26.25
Painesville, O.	25.50
Philadelphia	23.00
Portsmouth, O.	24.00
St. Louis, del.	26.00
St. Paul	23.75
Swedeland, Pa.	23.00
Terre Haute, Ind.	24.05

PIG IRON

(Per gross ton f.o.b. furnace)

	No. 2 Foundry	Malleable
Bethlehem, Pa.	$58.50	$59.00
Birmingham	52.88	....
Buffalo	56.50	57.00
Chicago	56.50	56.50
Cleveland	56.50	56.50
Everett, Mass.	61.00	61.50
Fontana, Calif.	62.50	....
Geneva, Utah	56.50	....
Granite City, Ill.	58.40	58.90
Lone Star, Tex.	52.50	52.50
Neville Island (Pittsburgh)	56.50	56.50
Steelton, Pa.	58.50	59.00
Swedeland, Pa.	58.50	59.00
Toledo, O.	56.50	56.50
Troy, N. Y.	58.50	59.00
Youngstown, O.	....	56.50

NONFERROUS INGOT

(Cents per pound, carlots)

BRASS AND BRONZE: Red brass, No. 115, 30.00; tin bronze, No. 225, 41.00; No. 245, 34.75; high-leaded tin bronze, No. 305, 34.00; No. 1 yellow, No. 405, 25.75; manganese bronze, No. 421, 27.75.

ALUMINUM: 99 per cent plus, primary ingots 23.2. Secondary No. 12 alloy 23.50. Deoxidizing grades: No. 1 24.50-25.00; No. 4 22.50.

MAGNESIUM: 99.8 per cent notched ingots 27.75, f.o.b. Freeport, Tex. (10,000 lb or more).

COPPER: Electrolytic 30.00, delivered Connecticut valley.

ZINC: High grade 12.85, delivered. Die casting alloy 15.50, delivered.

IRON AND STEEL SCRAP

(Consumer prices per gross ton delivered, except as otherwise noted)

	No. 1 Heavy Melting Steel	No. 1 Cupola Cast	Heavy Breakable Cast	Clean Auto Cast	Machinery Cast	Malleable	Short Steel Rails
Birmingham	$28.00–29.00	**$45.00–46.00	.....	.....	.....	.....	$40.00–41.00
Boston*	**24.00–25.00	**29.00–30.00	.....	.....	**32.00–33.00	.....	.....
Buffalo	30.00–31.00	**38.00–39.00	.....	.....	**43.00–44.00	.....	42.00–43.00
Chicago	34.00–36.00	39.00–41.00	.....	44.00–45.00	44.00–45.00	44.00–45.00	50.00–52.00
Cincinnati*	**31.00–32.00	**39.00	**35.00	.....	**45.00	.....	**46.00–47.00
Cleveland	33.00–34.00	44.00–45.00	30.00–31.00	43.00–44.00	44.00–45.00	44.00–45.00	48.00–50.00
Detroit*	**27.00	**34.00	**25.00	**38.00	.....	**30.00	.....
Los Angeles	28.00	**42.00–44.00	.....	.....	.....	.....	.....
New York*	27.50–28.50	29.00–30.00	.....	.....	.....	.....	.....
Philadelphia	33.50	35.00	37.00	.....	42.00–43.00	41.50–43.00	.....
Pittsburgh	36.00–37.00	36.00–37.00	31.00–32.00	.....	42.00–43.00	.....	47.00–49.00
St. Louis*	31.00	40.00	32.50	41.00	.....	.....	46.00
San Francisco	24.00	40.00	36.00	39.00	48.00	.....	.....
Seattle	29.00	**32.00	**23.00	.....	.....	.....	.....

*Brokers' buying prices. **F.o.b. shipping point.

WHITEHEAD'S
MOISTURE CONTROLLED
NATURAL BONDED
DORCHESTER MOLDING SANDS AND GRAVELS

Guaranteed Moisture Content Not More Than 6%

LEADER IN FOUNDRY SANDS SINCE 1841

These natural bonded sands and gravels are widely used for Molds and Cores in Iron, Steel, Alloy, and Non-Ferrous Castings. They are noted for colloidal clay giving high green and dry strength. Because of low fines in the grain distribution, these sands have high permeability. Here are advantages you may expect from Whitehead's Naturally Bonded Moisture Controlled Dorchester Sands and Gravels.

1 ***Moisture Controlled Sands Do Not Freeze—***

a. Easier to unload . . . means lower unloading costs.
b. Reduces handling costs to and from storage bins.

2 ***Moisture Controlled Sands Are Economical—***

a. Sands with 15% moisture have 1700 lbs. sand and 300 lbs. water in each ton.
b. Moisture Controlled Sands with 6% moisture have 1880 lbs. sand and 120 lbs. water in each ton.
c. On each ton of Moisture Controlled Sands you *SAVE price of sand and freight on 180 lbs. of water.* Sand has just proper amount of moisture to eliminate dust hazard.

3 ***Ready for Use on Arrival at Foundry—***

a. Dorchester Moisture Controlled Sands and Gravels arrive with proper working moisture content so that they can be used at once.
b. Aids you in control of sands in foundry.

Whitehead Brothers COMPANY

Established 1841

NEW YORK OFFICE
324 West 23rd St., New York 11, N. Y.

NEW ENGLAND OFFICE
17 Exchange Place, Providence 1, R. I.

Manufacturers of:

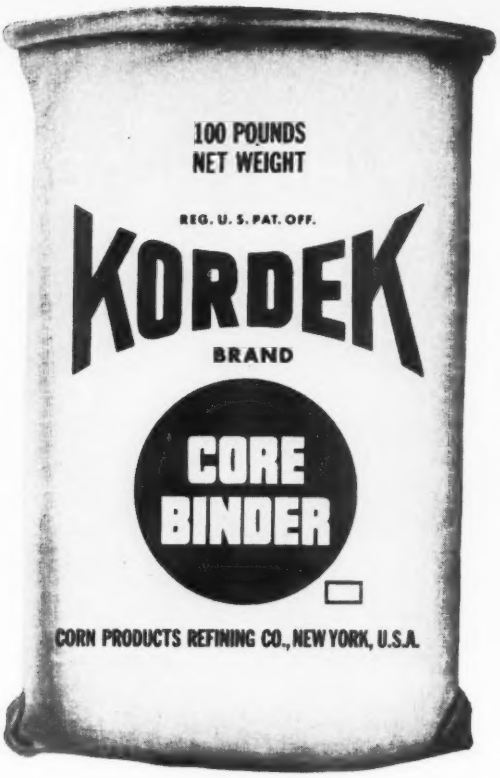
LYQUAGRIP
Ready-to-use core paste

DOB-IT
Ready-to-use core mudding compound

JOINT-SEAL
Plastic compound for perfect sealing

LYQUAFLOUR
For cleaner surface, better shakeout

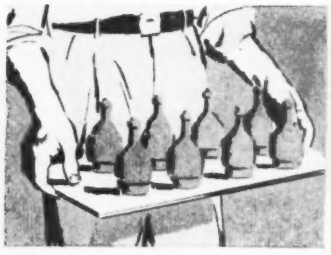
LYQUAFACE
The liquid sand grain coating



why KORDEK® is the preferred dry bond for cores

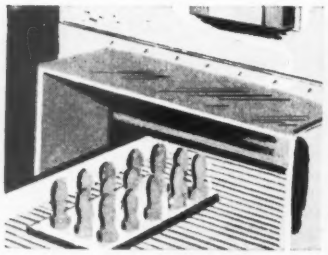
Kordek Core Binder renders complete binder coverage for foundry purposes. Kordek Core Binder develops a superior dry bond. Kordek is highly soluble, does not absorb core oil, and burns out completely, delivering smooth draws. Quick deliveries of Kordek can be made to any plant location.

Special technical consultation is yours without cost or obligation.



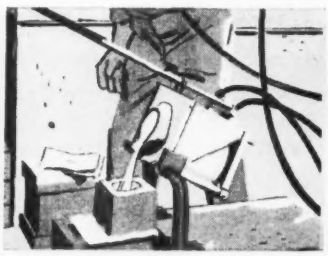
Superior Bake Strength

Kordek-bonded cores maintain shape and dimension throughout handling and storage.



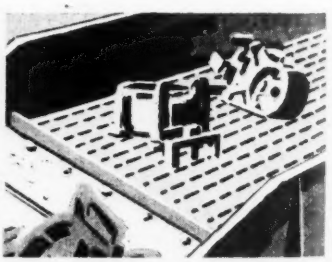
Quick Drying

This property cuts down oven time, thus increasing oven capacity.



Excellent Permeability

You reduce costly "blows" and casting losses due to inadequate venting.



Adequate Collapsibility

Kordek burns out at just the proper instant, eliminating strains and hot-tears.

CORN PRODUCTS REFINING COMPANY

17 Battery Place, New York 4, N. Y.

Get a Bonus in Every Bucket!

——— *with a* MICHIGAN

Notice two facts about this operation:

1 **More than 2 yards in that 1 yard capacity bucket—a 100% bonus load!**

The independent bucket control on MICHIGAN tractor shovels makes this kind of performance possible. Two powerful double-acting cylinders on the MICHIGAN bucket provide tremendous break-out power, enable the operator to "work" the bucket while it's buried deep in the pile. His bucket-control lever *over-rides* the boom-hoist, so he doesn't have to lift the bucket out of the pile *until* he's got a heaping bonus-load.

2 **All wheels solidly on the ground!**

Here's proof of the MICHIGAN'S bonus margin of weight distribution. These are the heaviest, most powerful tractor shovels on the market today. Even with a 100% bonus bucket load, you still have complete stability and traction.

One brief demonstration will convince you quickly that you'll get a Bonus Bucket every time with a MICHIGAN Tractor Shovel—for more yardage moved, in fastest time, at lowest cost. Such a test is easy to arrange—simply call your nearby MICHIGAN distributor; or use the coupon. MICHIGAN Tractor Shovels are available under the Clark leasing Plan—we'll be glad to send you details.

CLARK EQUIPMENT

CLARK EQUIPMENT COMPANY
Construction Machinery Division
442 Second Street
Benton Harbor, Michigan

23

What's this about demonstrating the MICHIGAN Tractor Shovel?

Also, send us ☐ Specifications . . . and ☐ Lease Plan data sheet

Name_____

Firm_____ Title_____

Address_____

City_____ County_____ State_____

5 big "TOUCH of GOLD" advantages of NORTON K BOND† WHEELS

for your slow speed snagging of gray or malleable iron or non-ferrous metals

1. Faster, freer cutting action 2. Much longer wheel life
3. Less frequent dressing 4. Corners held better 5. Consistent duplication

You can count on Norton K Bond wheels to deliver every one of these money-saving benefits on every slow speed snagging job in your cleaning room—on gray or malleable iron or on non-ferrous metals.

That's because the K Bond is the most radically improved vitrified bond ever developed for these applications. As a result, Norton CRYSTOLON* wheels bonded with it are consistently outperforming and outlasting other wheels.

This has been proved in foundries through the country — on equipment ranging from light portable grinders to heavy swing frames and including floor and bench stands. Here are some typical reports, telling how Norton K Bond wheels add the "Touch of Gold" that cuts cleaning room costs:

- *"K Bond wheels increased wheel-life from 80 to 120 hours. Also reduced operator fatigue."*
- *"Best and fastest cutting wheels ever used."*
- *"We ground an average of 11,000 more piston rings with K Bond wheels than any wheel formerly used."*
- *"Excellent performers. Faster cutting and lasted a week longer than other wheels."*
- *"K Bond wheels lasting 20% longer. Best wheels in our experience.'*

Test Them In Your Own Foundry

Your Norton Distributor will be glad to arrange a test of K Bond CRYSTOLON wheels in your own plant. Take advantage of this opportunity — get proof of how these revolutionary wheels will grind off more metal per dollar on your slow speed snagging jobs. NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your phone directory, yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

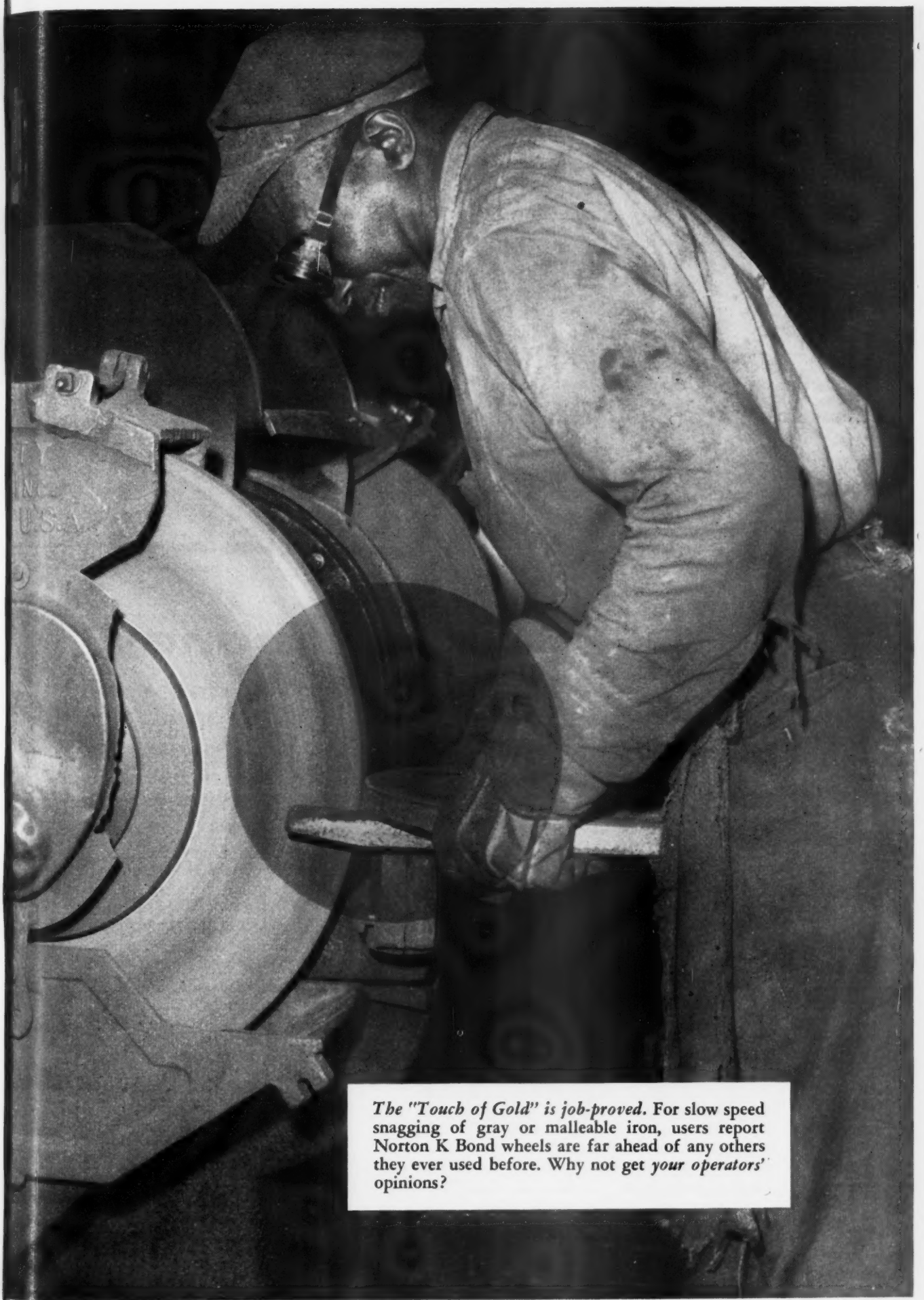
Making better products... to make your products better

NORTON

and its BEHR-MANNING division

NORTON: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

† Patent applied for * Reg. U. S. Pat. Off. and Foreign Countries



The "Touch of Gold" is job-proved. For slow speed snagging of gray or malleable iron, users report Norton K Bond wheels are far ahead of any others they ever used before. Why not get *your operators'* opinions?

CINCINNATI

SNAGGING PD

WHEELS

will save you money

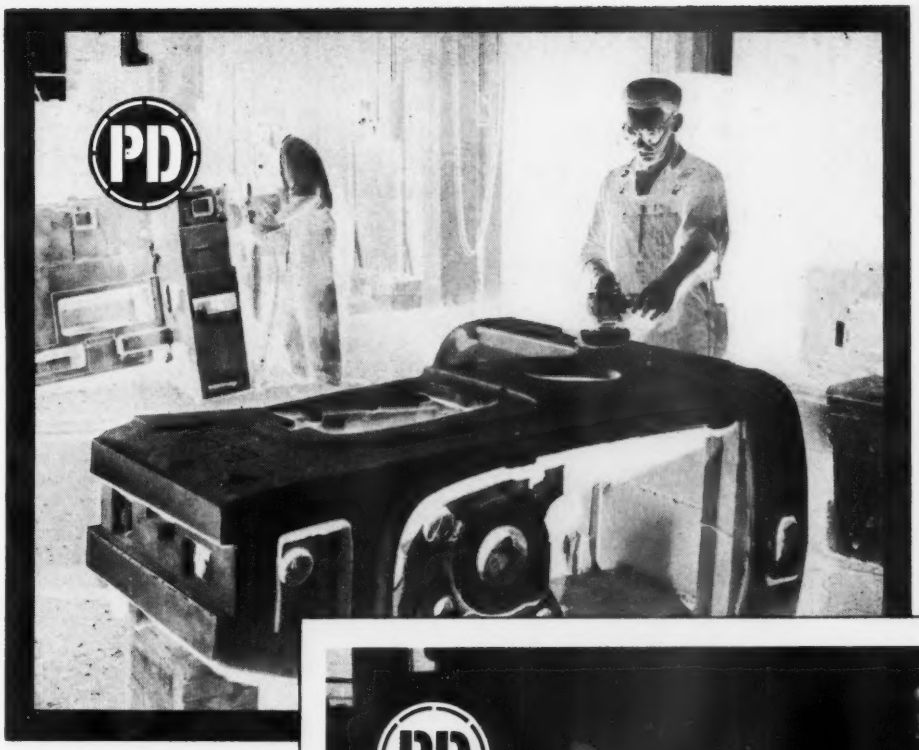
It's true! CINCINNATI (PD) SNAGGING WHEELS *will* save you money. Foundry after foundry, from coast to coast, report that CINCINNATI (PD) WHEELS do a better snagging job, giving outstanding economy through freer cutting action . . . self-dressing action . . . *and Positive Duplication.*

Just as a negative guarantees exact duplication of a photograph, the CINCINNATI (PD) Manufacturing Process assures a Positive Duplication of the original wheel *every* time you reorder.

Positive Duplication (PD) is the result of extensive manufacturing research and the development of new standards of manufacture with 36 quality control steps. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike—providing the same long wheel life, the same reduced operator fatigue and the same self-dressing action.

Yet these better, cost-cutting CINCINNATI (PD) WHEELS are priced no higher than ordinary wheels.

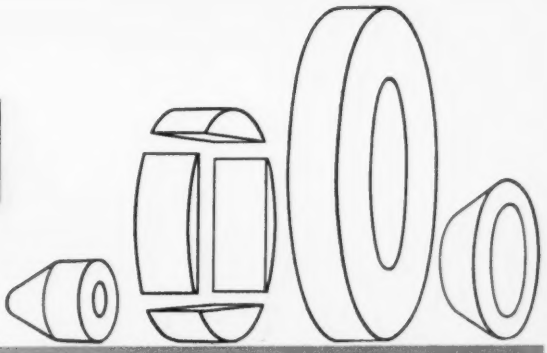
CINCINNATI (PD) WHEELS are made in vitrified and resinoid bonds for ferrous and non-ferrous foundries. They are available in a complete variety of popular sizes and shapes. We'll be happy to tell you about our complete line of straight wheels, cups, cones and plugs, and to prove to you how CINCINNATI (PD) WHEELS will *do a better snagging* job . . . and *save you money*. Just contact us and we'll send one of our representatives. Wire, write or telephone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.



Just as a NEGATIVE guarantees you an exact duplication of a photograph each and every time, you are always assured a . . .

. . . POSITIVE DUPLICATION of an original grinding wheel each and every time through the CINCINNATI (PD) Manufacturing Process.

CINCINNATI
Grinding Wheels



A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

FIND THE CAUSE OF CRACKS

and you'll cut the COST of castings

With the black light of Magnaflux-Magnaglo, you can give a low cost check to each production step to find WHERE and WHY invisible cracks are being "built-in" your castings.

A high percentage of cracked castings doesn't just happen—there's always a reason. It may be in pouring, sprueing, shake-out, cleaning, handling, grinding or heat treating—even shipping.

But which step is at fault? why?

By answering these questions, non-destructive inspection with Magnaflux* can help you SAVE MONEY. By sample checking of the output from each production step, Magnaflux shows where the cracks *first* appear, helps you to find the faulty operation or process and suggests the remedy. Correction often involves only a minor change in production techniques. Result: production runs with almost no cracks.

How much you can save with Magnaflux naturally depends somewhat upon your own operation. In practically every case Magnaflux can help you to turn out better castings *at greater profit per casting.* Ask to have a Magnaflux engineer give you the facts and figures! They're interesting and enlightening! Set the date now!

*Magnaflux is a registered trademark of the Magnaflux Corporation.

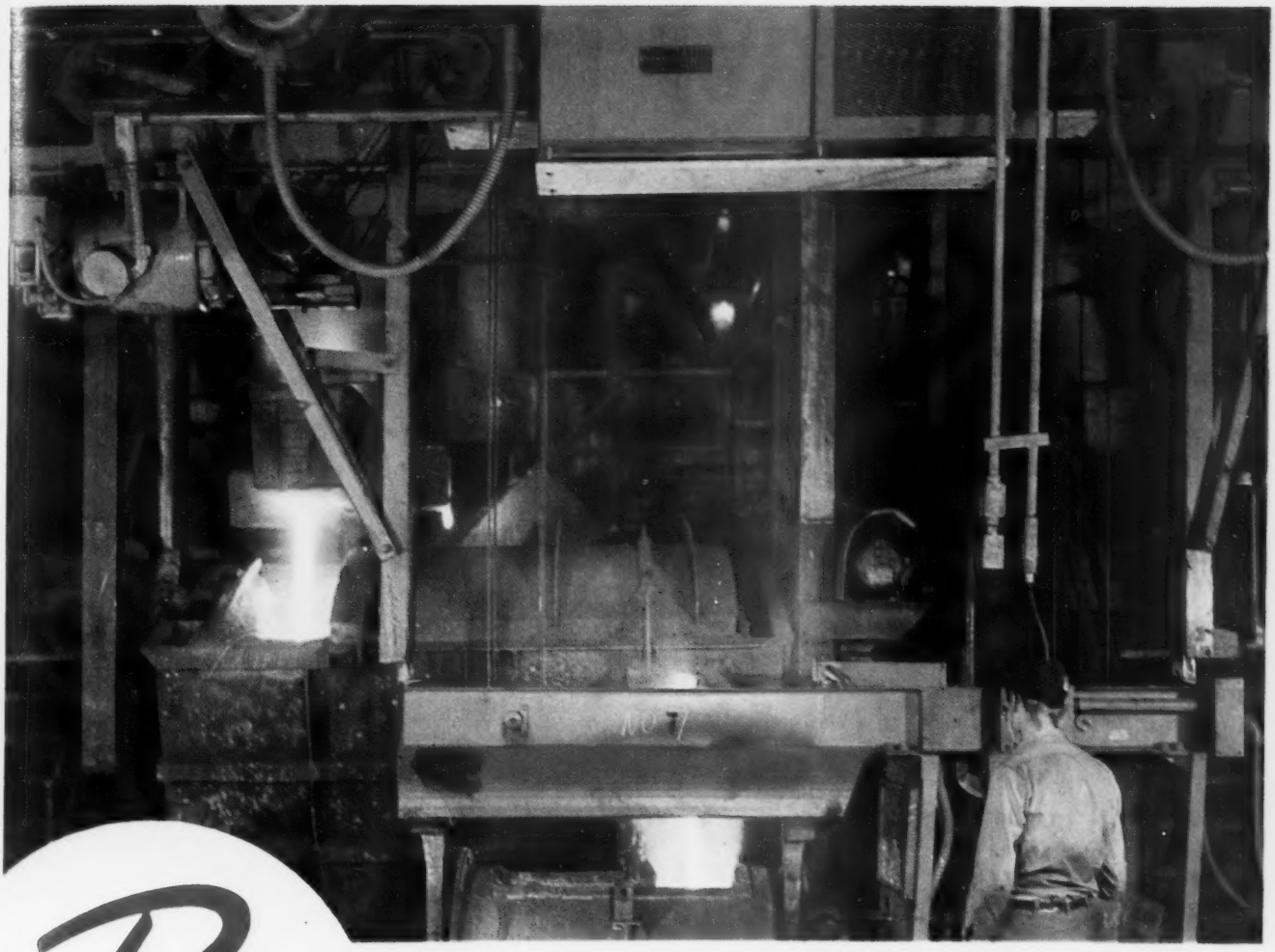
IMPROPER HANDLING CAUSED THIS CRACK

White line on bell-end casting for an electric motor is a Magnaglo indication of a crack. Sampling inspection with Magnaflux showed handling methods were consistently causing this crack. With the cause located, correction was simple — production of sound castings increased.

MAGNAFLUX

MAGNAFLUX CORPORATION
7350 West Lawrence Ave. • Chicago 31, Ill.

New York 36 • Pittsburgh 36 • Cleveland 15
Detroit 11 • Dallas 19 • Los Angeles 58



Ross.... Complete Line of Air Valves for Simpler Maintenance... Less Cost

Standardize on Ross Valves for maximum efficiency... minimum service expense. • Ross valves are available in thousands of standard types in ⅛″ to 2″ pipe sizes. • Prompt, expert engineering service around the world. • Ask your nearby Ross representative to acquaint you with the complete Ross valve line for foundries.

ROSS Control VALVES

Ross OPERATING VALVE COMPANY

120 E. GOLDEN GATE AVENUE • DETROIT 3 • MICHIGAN

A spray for molds and cores

TOP-BOND is a surface hardening medium for molds and cores—an air drying spray that penetrates deeply and ties surface sand tightly in place. The air drying operation is a fast one. It leaves the surface firm and hard and protects a clean casting surface at the sand line. A slight torching will speed up drying or, if cores are sprayed while still warm from the oven, they will dry while cooling. The results—beautifully clean castings with a fine surface and perfect contours.

One customer who pours alloy castings that are corrosion, abrasion and heat resisting, has used Top-bond for years. He writes, — "You will be interested in knowing that we have eliminated all the dipping and washing of cores for our squeezer production by spraying with Top-bond. This has saved us the labor of two core makers, plus an extra drying cycle. Many of our cores are blown and have a relatively soft surface which breaks down considerably in handling from our core room to storage to molds. The use of Top-bond protects this surface and gives an interior finish equal or better than obtained from Silica type washes. "We are also using Top-bond as an air dry spray in our green sand molds. This has permitted us to use green sand where dry sand was formerly considered imperative."

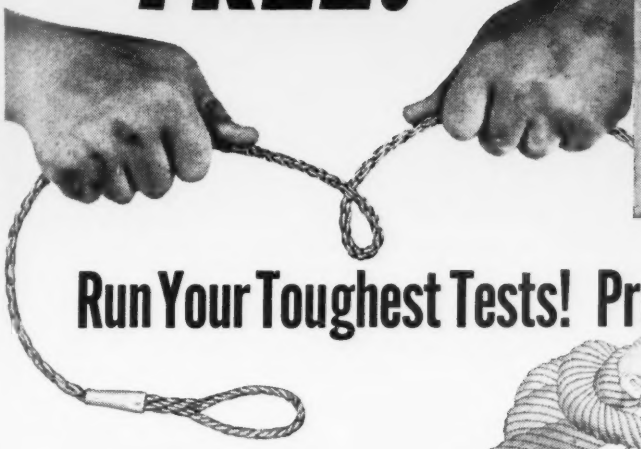
Steel foundries use Top-bond as a spray for green sand cores to build surface hardness up to the hardness of baked cores. When sprayed on their molds, it will keep the surface firm and edges sharp. This kind of an investment in Top-bond starts paying dividends right away.

Write us for a bulletin that describes Top-bond more fully and remember it's Top-bond for top quality and top performance.

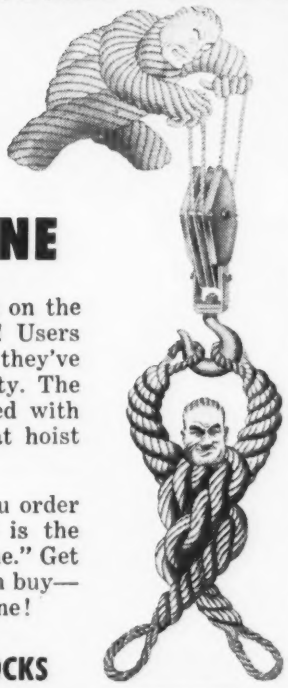
UNITED OIL MFG. COMPANY

1429 WALNUT STREET, ERIE, PA.

NOW!
TORTURE-TEST a Tuffy® SLING FREE!



Run Your Toughest Tests! Prove Tuffy's Toughness Yourself!



Tuffy® HOIST LINE

Equals Tuffy Slings in ability to stay on the job longer . . . reduce operating costs! Users report Tuffy Hoist Line is the best they've ever seen for strength and wearability. The reason? Tuffy is specially constructed with the extra flexibility and stamina that hoist line work *demands*.

No Confusing Specifications! When you order Tuffy, all you tell your distributor is the length, diameter and "Tuffy Hoist Line." Get all the hoisting service your money can buy—reeve *your* crane with Tuffy Hoist Line!

YOUR Tuffy DISTRIBUTOR STOCKS THE REPLACEMENT ROPES YOU NEED!

Just Give Him An Idea of your future requirements and he will stock up from his nearby Union Wire mill depot. That way, when you need rope in a hurry, he's ready to rush it to you immediately! Talk over your replacement schedule with your Tuffy distributor *today*.

Kink It, Loop It, Jerk It! Tie knots in your free Tuffy Sling or use it to hoist weights up to *twice* the rated working load! Do your worst to the Tuffy Sling we give you and you'll see why we say Tuffy is the toughest sling you can buy!

Exclusive, Patented Construction of machine braided wire fabric makes Tuffy Slings extra flexible to resist kinking. And if you *can* kink it, you'll be able to straighten your free Tuffy Sling—or any Tuffy Sling—easily with *no material damage*.

Find Out How Tuffy gives you unbeatable service under stresses and strains of all kinds. Send for your free Tuffy Sling and convince yourself that Tuffy is the toughest in the business!

TEAR OFF AND MAIL COUPON NOW

Union Wire Rope Corporation
2280 Manchester Ave., Kansas City 26, Mo.

At no cost or obligation to me, please rush the material I have checked:

- ☐ FREE 3-Ft. Tuffy Sling!
- ☐ FREE Sling Handbook and Rigger's Manual, Featuring 12 Tuffy Factory-Fitted Types!
- ☐ Name and Address of Tuffy Distributor Nearest Me!

FIRM NAME_____

BY_____ TITLE_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

union Wire Rope **corp.**

Specialists in High Carbon Wire, Wire Rope and Braided Wire Fabric

A Completely New and Different PAYLOADER®

...years ahead in design, construction and performance!

the NEW model HA

Thirty four years of pioneering experience by the manufacturer who has produced more complete tractor-shovel units than all others put together . . . more than three years of development and field-testing . . . this new HA model may well set new standards of mobile bulk materials handling performance for industrial operations.

...actual performance records prove amazing superiority!

carrying capacity?

TWICE AS MUCH as previous HA model; more than any other comparable size.

lifting capacity?

MORE THAN TWICE AS MUCH as previous; more than any other comparable size.

digging capacity?

MORE THAN TWICE AS MUCH as previous; more than any other comparable size.

bucket capacity?

16-2/3% INCREASE in (struck) capacity; 18 cubic feet PAYLOAD (heaped) capacity.

dumping height?

18 PERCENT INCREASE in maximum dumping height over previous "HA" PAY-LOADER model.

turning radius?

SHORTER TURNING RADIUS than before with no increase in width, height or wheelbase.

safety features?

SETS NEW STANDARDS of safety in load carrying and driver protection.

production output?

INCREASED 50 TO 100% over previous model; more than any other comparable size.

accessibility?

IMPROVED EASE OF ACCESSIBILITY of all service points for better maintenance.

other features?

BREAKOUT BUCKET ACTION with 40° TIPBACK; sealed brakes; improved steering; new solenoid starting controls; new ignition lock; hydraulic accumulator; sealed and pressurized hydraulic tank; double-acting rams; torque converter; improved bucket construction; dustproof distributor; hose connectors; sealed grease fittings; new pin lock design; improved ground clearance; increased drawbar pull; chrome-plated piston rods; new parking brake and many others. Send for new specification catalog.

PAYLOADER®

THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.

SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

THE FRANK G. HOUGH CO.
703 SUNNYSIDE AVE. • LIBERTYVILLE, ILL.

Send me full information on the new Model HA

Name .....

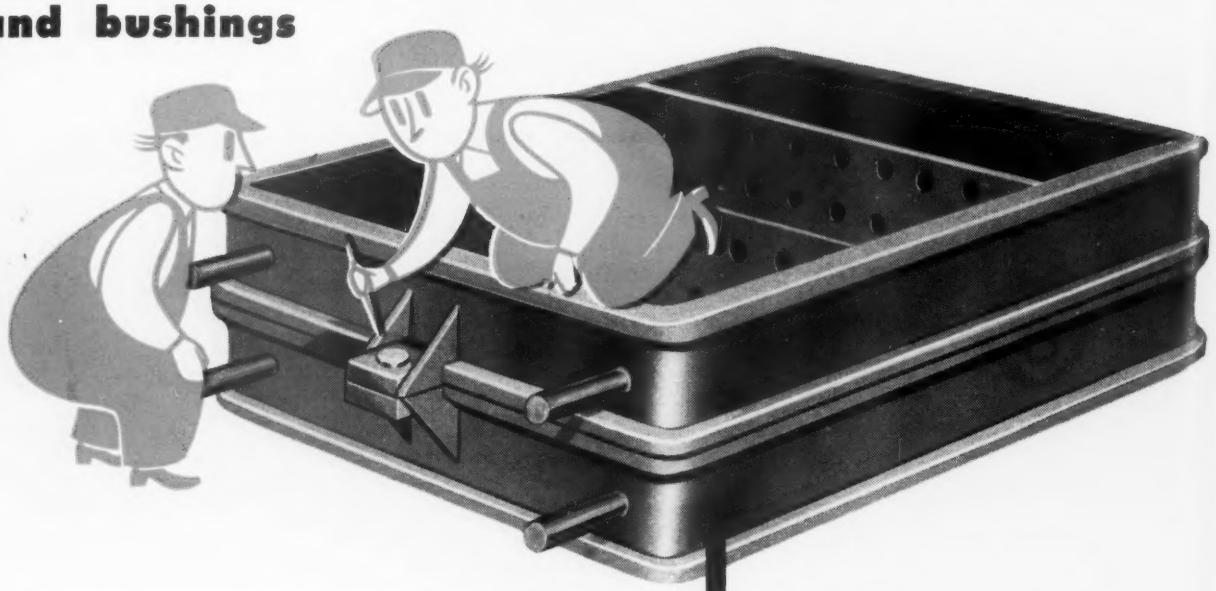
Title .....

Company .....

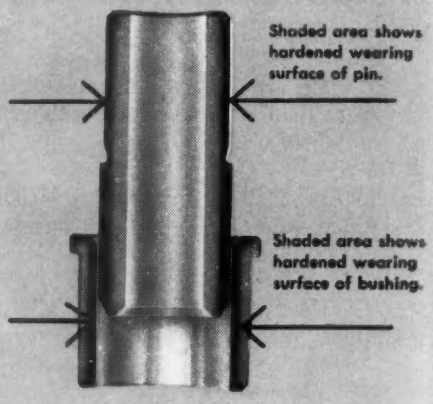
Street .....

City ..... State .....

carburized and hardened wearing surfaces increase life of UNIVERSAL flask pins and bushings



The wearing surfaces of Universal flask pins and bushings are carburized and hardened so they can take long, rigorous wear and rough treatment in the foundry. Both pins and bushings are double quenched and double drawn to produce strong ductile cores with a fine grain structure that will withstand considerable stress and strain without breaking. Universal flask pins and bushings are precision ground to extremely close tolerances to insure instant, accurate alignment of cope and drag. Plain, taper, round, hexagonal and threaded series pins and bushings are available in a complete range of sizes as regular stock items. For complete information, write to the office nearest you — Universal Engineering Sales Co., 1060 Broad St., Newark 2, N. J.; 5035 Sixth Ave., Kenosha, Wisc., or the home office.



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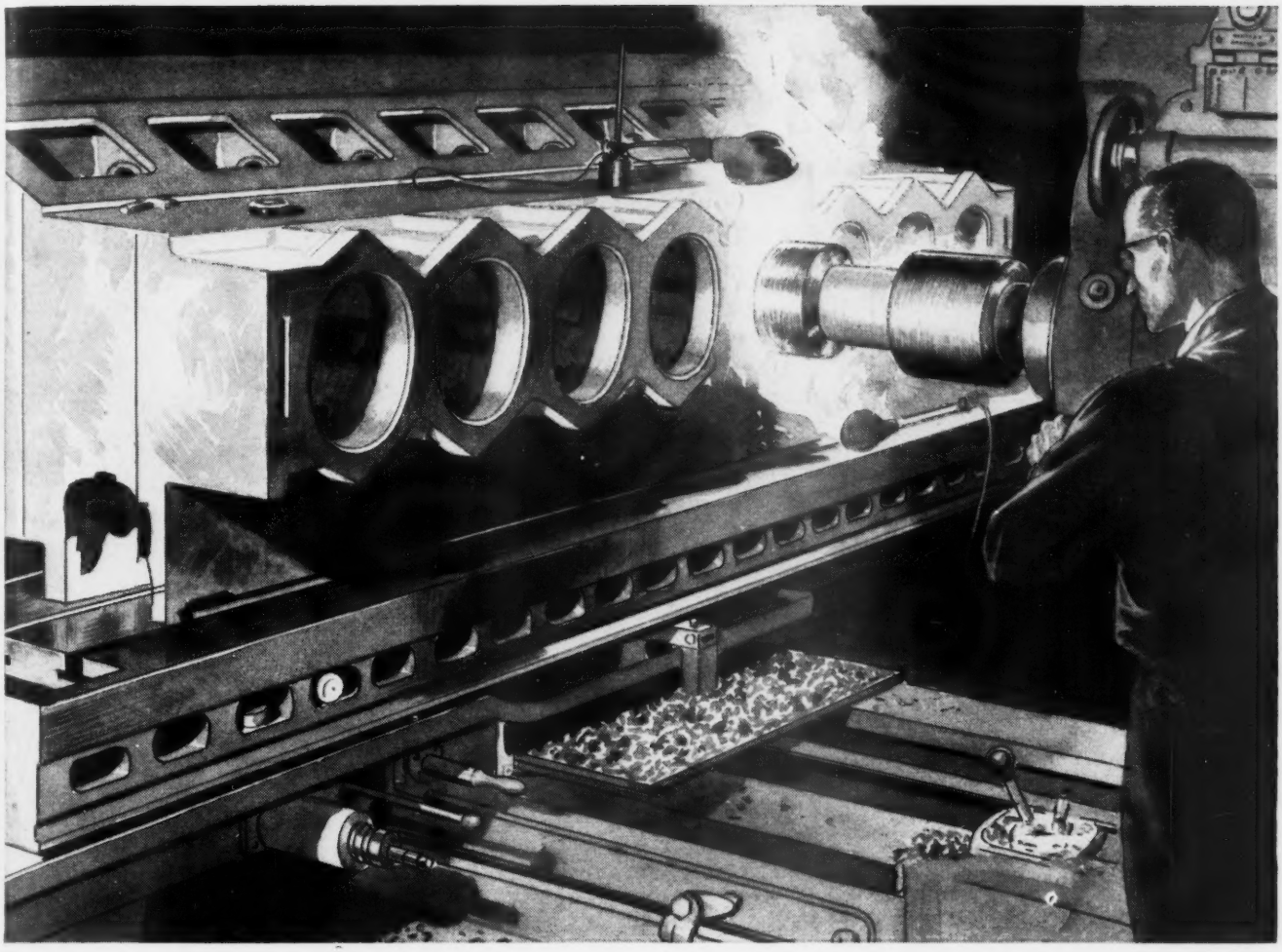
UNIVERSAL ENGINEERING COMPANY FRANKENMUTH 4, MICHIGAN



Insure good machinability with as little as 2 to 4 lb. of SMZ alloy per ton of Iron

Today's high-speed machining operations make it more important than ever to control the structure of iron castings. Castings with chilled corners and edges or hard spots may cause costly tool breakage and interrupted production.

An effective, low-cost method of insuring satisfactory machinability is the addition of SMZ alloy to the iron in the ladle. An addition of only 2 to 4 lb. per ton of iron is sufficient to reduce chill, control the uniformity of structure, and produce castings with excellent machinability.

SMZ alloy is a balanced inoculant containing 60 to 65 per cent silicon, 5 to 7 per cent manganese, and 5 to 7 per cent zirconium. Further information about the advantages of using SMZ alloy will be gladly furnished on request. The ELECTROMET office nearest you will be pleased to answer your inquiry.

The terms "Electromet" and "SMZ" are registered trade-marks of Union Carbide and Carbon Corporation.

ELECTRO METALLURGICAL COMPANY

A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.

OFFICES: Birmingham • Chicago • Cleveland • Detroit
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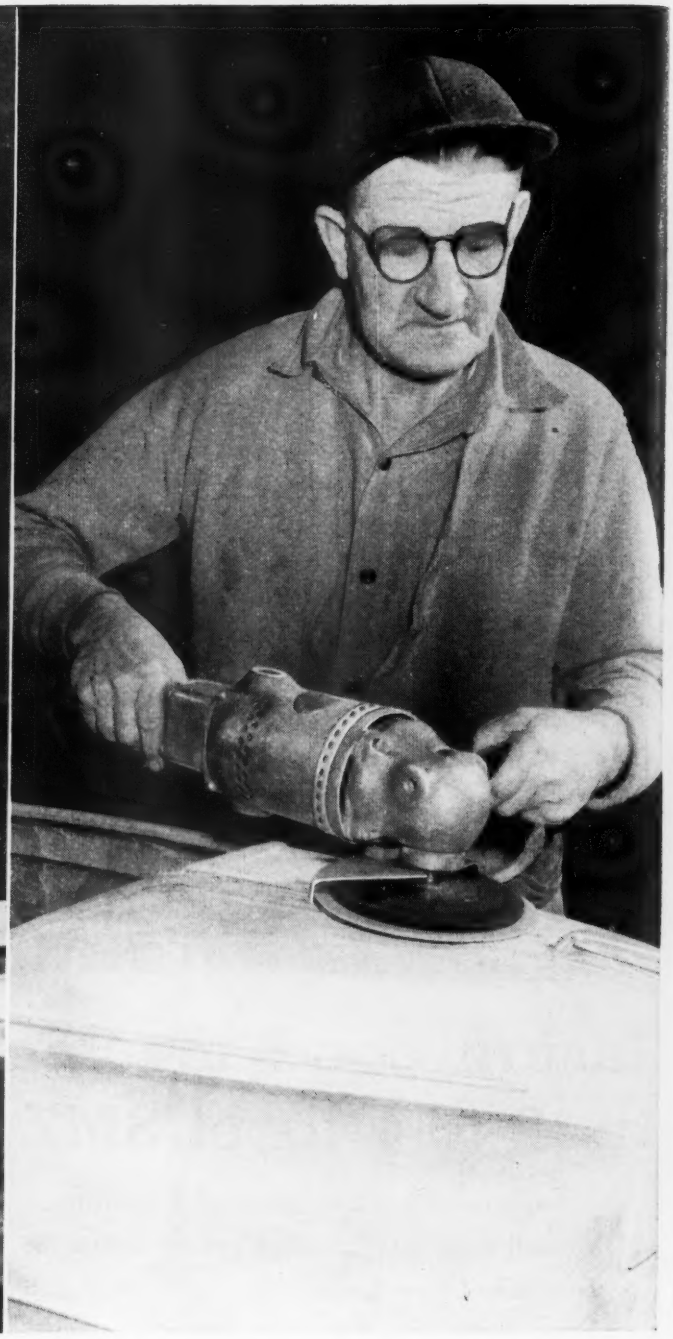
Electromet
TRADE MARK
Ferro-Alloys and Metals

Reducing welds with straight wheel



Blending welds with depressed center wheel

CUT COSTS *on every*

YOUR CARBORUNDUM DISTRIBUTOR OR SALESMAN will show you which of these products is best for each of your operations...and why! Call him today—he's listed in the yellow pages of your phone book under "Abrasives" or "Grinding Wheels." Years of experience, unbiased counsel, complete stocks of abrasives and fast, dependable service make him your one source for help on every grinding and finishing problem. Or, if you prefer, write to The Carborundum Company, Dept. F 81-54, Niagara Falls, New York. In Canada: Canadian Carborundum Company, Ltd., Niagara Falls, Ontario.

Rough grinding with cup wheel

Cleaning casting with cone wheel

PORTABLE GRINDING *job!*

Are *you* getting maximum production at lowest possible cost from your portable grinding operations? There's ONE way to be sure—use the proper abrasive product by Carborundum for every type of portable grinding machine—air or electric—in your shop.

YOUR WIDEST CHOICE of abrasives by CARBORUNDUM assures you of the *one* best suited to every metalworking operation, whether you're rough grinding or snagging...weld grinding or deburring...smoothing edges, finishing or polishing. Choose from *seven* different types of wheels, including straight wheels, cups, rubber-bushed wheels, mounted wheels or versatile MX® and CARBOFLEX products.

CARBORUNDUM

REGISTERED TRADE MARK

...continually putting more **SENSE** *in your abrasive* **DOLLAR**

81-54

THE IDEAL METHOD:

INDUCTION MELTING

for all metals . . .

Fast, efficient melting

Exact reproduction of analysis

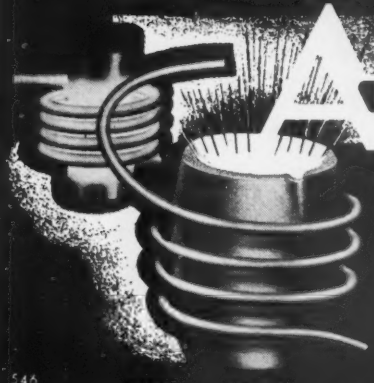
Positive temperature control

Minimum metal loss

Highest production rates

Sizes from 8 ozs. to 8 tons

Write for information



AJAX NORTHRUP SINCE 1916

INDUCTION HEATING-MELTING

AJAX ELECTROTHERMIC CORPORATION • TRENTON 5, NEW JERSEY

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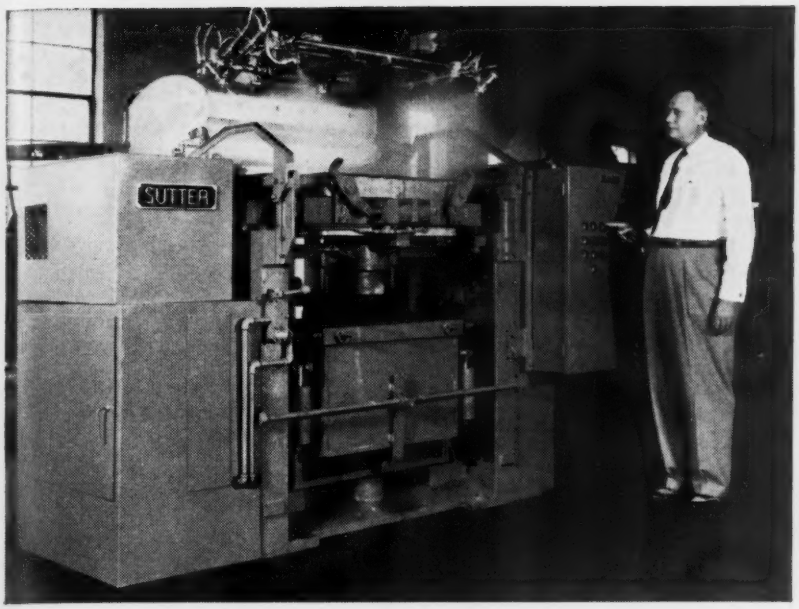
ASSOCIATED COMPANIES: AJAX ELECTRIC FURNACE CORPORATION • AJAX ELECTRIC COMPANY • AJAX ENGINEERING CORPORATION



Mr. Ray Sutter at the single-station control panel of the shell molding machine made by Sutter Products, Dearborn, Michigan. The Sutter was one of the first machines to provide a completely automatic molding cycle including closely controlled coating, temperature and curing time. Maximum shell capacity is 20" x 30" x 6"; production rate 45 to 60 shells per hour. Gasfired; electric curing oven optional.

SPEED SHELL MOLDING WITH DOW CORNING 8 EMULSION

- **Assure Fast, Positive Release**
- **Keep Patterns Clean**
- **Nonflammable and Noncorrosive**
- **Dilutable in Hard or Soft Water**
- **Resists Creaming or Separating**

You can rely on Dow Corning 8 Emulsion to deliver finished shells promptly, easily and economically. Especially designed for the shell process, this silicone parting agent can't break down at operating temperatures to form a carbonaceous deposit on pattern surfaces. Cleaning costs are minimized, and you increase production of shells with consistently high dimensional accuracy. For more information and a free trial sample, return the coupon today.

DOW CORNING CORPORATION
MIDLAND MICHIGAN

first in silicones

DOW CORNING SILICONES

ATLANTA CHICAGO CLEVELAND DALLAS DETROIT LOS ANGELES NEW YORK WASHINGTON, D.C. (SILVER SPRING, MD.)
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DOW CORNING SILICONES **in the Foundry**

FORD MOTOR USES SILICONE GREASE IN CORE OVEN CONVEYOR BEARINGS

With peak temperatures reaching 700 F, the six core oven conveyors at the River Rouge foundry of Ford Motor Company operate 16 hours a day, five days a week. Each system has 4 six-inch roller bearings mounted in the oven and 1200 trolley bearings that are exposed to oven temperatures an average of 2½ out of every 4 operating hours.

That's rough treatment for any bearing. Despite continuous lubrication and frequent cleaning, no conventional organic lubricant was able to prevent repeated work stoppages. Trolley bearings froze; rolling surfaces were flattened.

In 1948, after several successful test runs, Ford changed over to Dow Corning 41 Grease in all 7224 trolley and roller bearings. Power required to move the conveyors dropped 80%. The relubrication schedule for trolley bearings was reduced to once a week; once a month for the roller bearings. Labor, replacement and maintenance costs have been cut to a fraction of their former level.

Ford's experience is typical of the reports received from hundreds of plants now using Dow Corning 41 Grease in low-speed, antifriction bearings exposed to high operating temperatures. Data and performance as proved by many case histories are given in a new brochure on this remarkably heat-stable and versatile silicone lubricant. For your free copy of this brochure, call our nearest branch office or,

Mail this coupon TODAY

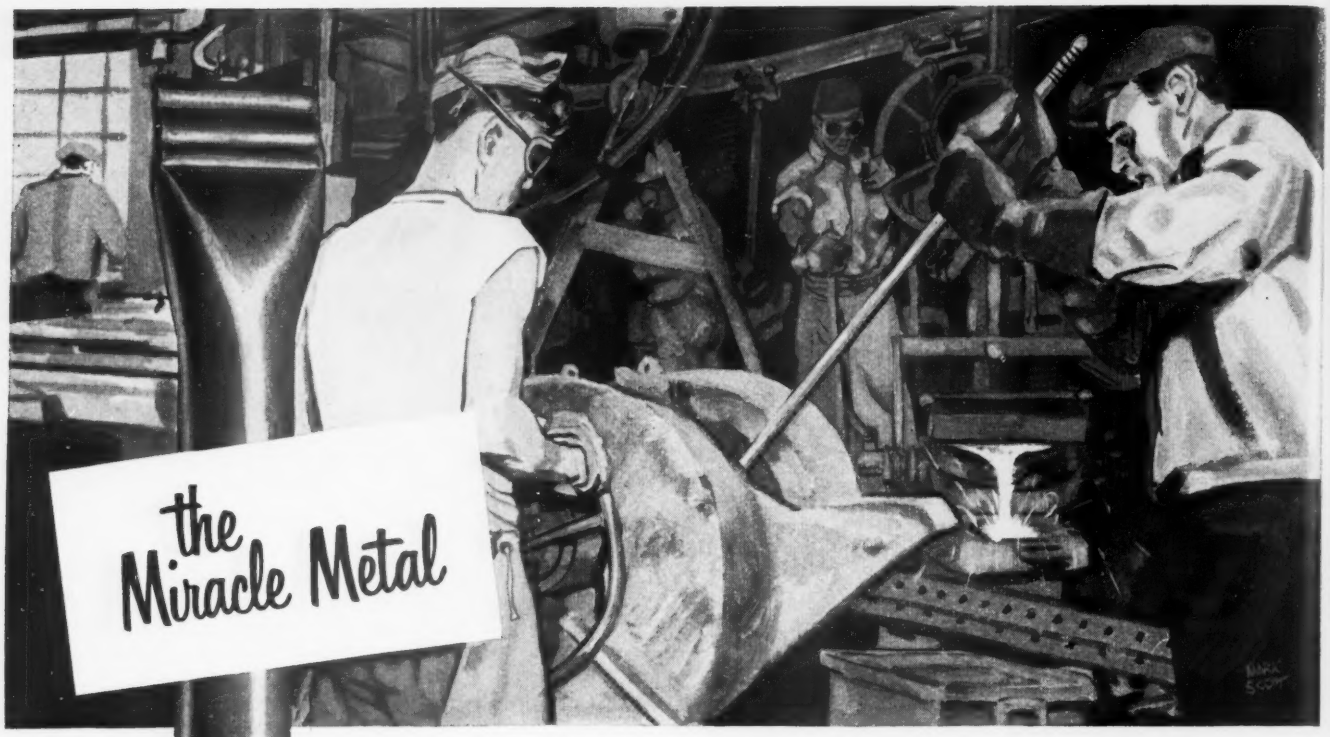
DOW CORNING SILICONES

DOW CORNING CORP.
Dept. 5902
Midland, Michigan

Gentlemen: Please send me

- ☐ Technical data on Dow Corning 8 Emulsion
- ☐ Free sample of Dow Corning 8 Emulsion
- ☐ Performance data on Dow Corning 41 Grease

Name _____
Company _____
Street _____
City _____ Zone ____ State _____



LITHIUM

Only 0.005% makes a sounder nonferrous casting

Lithium economics and technique are both within the limits of everyday nonferrous foundry operation. A small slug (2¼ grams) of metallic Lithium added to a charge of molten copper effectively removes dissolved oxides and gases. End result is an improved, more uniform casting. By adding Lithium the surer way—in the handier *cartridge* form—you eliminate the "by-guess-and-by-gosh" formulation too common with less satisfactory methods.

Specifically, tensile strength and elongation are increased, porosity decreased, and grain size reduced. Characteristic low density causes the Lithium products formed to float to the surface where they are easily removed as slag. Again, Lithium Cartridges give you a sounder casting with less trouble and at less cost.

Tests under production conditions in nonferrous foundries have long established Lithium in metallurgy as a degasifier, deoxidizer, desulfurizer and general purifying agent. As a degasifier of Nickel Bronze, for example, Lithium Cartridges make possible a dense, fine-grained metal. Hermetically sealed in copper tubing, three sizes—2.25, 4.50 and 9.0 grams—are available.

Investigate Lithium Cartridges. Write for details of actual foundry tests. The small amounts of Lithium required put this revolutionary technique within *your* reach.

The application of Lithium requires no radical changes in conventional melting and casting processes. The cartridges are *quickly* introduced into the lower part of the crucible by wiring them into an inverted piece of angle iron or stainless steel, welded to a long rod handle, to prevent the light cartridge from rising to the surface before the reaction has taken place.

. . . trends ahead in industrial applications for Lithium

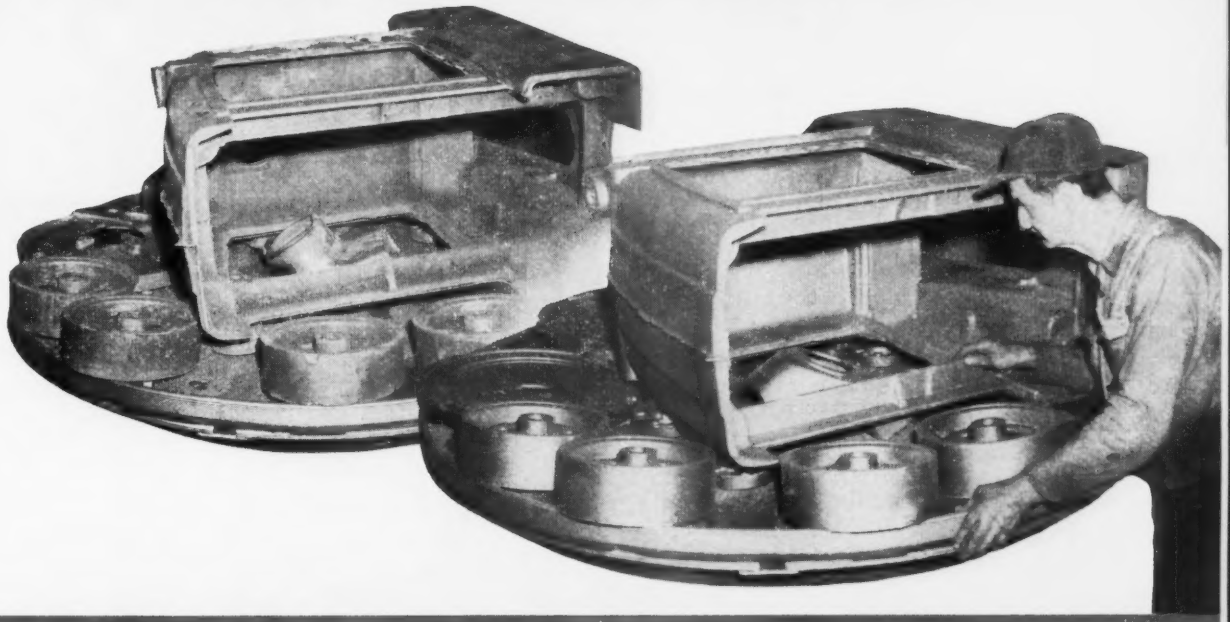
LITHIUM CORPORATION OF AMERICA, INC.
Suite B
Rand Tower
Minneapolis 2, Minnesota

MINES: Keystone, Custer, Hill City, South Dakota · Bessemer City, North Carolina · Cat Lake, Manitoba · Amos Area, Quebec
CHEMICAL PLANTS: St. Louis Park, Minnesota · Bessemer City, North Carolina · RESEARCH LABORATORY: St. Louis Park, Minnesota

CLEANING TIME CUT

from 5½ hours to 6 minutes

with the WHEELABRATOR®



Drastic reductions in cleaning time and costs are the obvious results of the high speed performance of the airless Wheelabrator. At a Wisconsin gray iron foundry, for example, time required for cleaning the 640 lb. casting, illustrated above, was slashed from 5½ hours by tumbling to just six minutes with the installation of a Wheelabrator Swing Table. Through such spectacular time savings, a 75% reduction in cleaning time was effected for their entire production.

Other equally important benefits resulted: Breakage was eliminated. Chipping and grinding operations were facilitated due to the sand and scale-free surfaces of the Wheelabrated castings, and foundry efficiency improved.

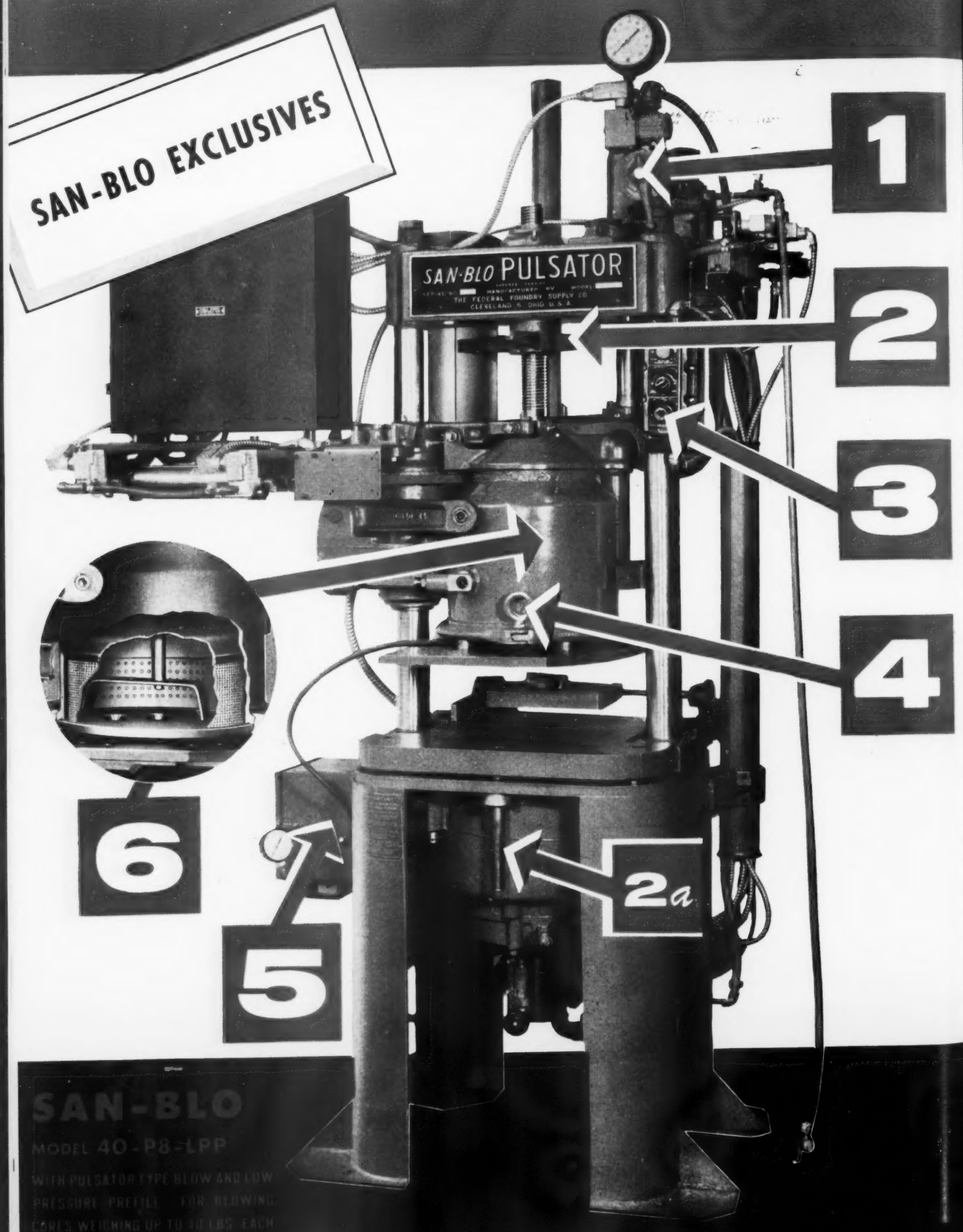
Do you have a cleaning problem that could benefit from Wheelabrator's cost-and-time-saving performance? Let one of the nearby Wheelabrator engineers give you the facts first hand. Write today for the complete story — Ask for Catalog 74C.

American WHEELABRATOR®

World's largest builders of airless blast equipment

AMERICAN WHEELABRATOR & EQUIPMENT CORP., 505 Byrkit St., Mishawaka, Indiana

SAN-BLO core blowers



SAN-BLO

MODEL 40-P8-LPP

WITH PULSATOR TYPE BLOW AND LOW PRESSURE PREFILL FOR BLOWING CORES WEIGHING UP TO 10 LBS. EACH

more for your money!!!

1 *LOW PRESSURE PREFILL*—Timer and air valve arrangement by means of which *low air pressure* is used to "riddle" sand into the core box and *full blow pressure* automatically cut in for ramming the core. Minimizes core box wear opposite blow holes—permits blowing wooden core boxes never blown before.

Optional on all models

2 *ADJUSTABLE SAND CHAMBER*—Sand chamber is easily raised or lowered to accommodate various height core boxes—eliminating "stooling" or expensive machine modifications. Each core box can be run with a minimum draw stroke and at maximum production speed. (Air-oil controlled draw mechanism shown in photo at "2a".)

Standard on all models

3 *SINGLE PUSH BUTTON CONTROL*—All SAN-BLO models have single push button control for automatic clamping, blowing and drawing operations. Timers and counters may be incorporated in the automatic cycle, as optional equipment, to further speed up refilling and blowing cycle.

Single control standard on all models.

4 *QUICK-CHANGE BLOW PLATE*—For closed core boxes, blow plate can be changed by removing clevis pin and clamp ring—no tools required!

Standard on all models

For open-top boxes, a quick-change, universal blow and vent plate assembly (not shown) provides for making up inexpensive blow plates in less than 10 minutes time, and changing them on the machine in a matter of seconds.

5 *PULSATOR TYPE BLOW*—**For blowing wooden core boxes, an air valve and control arrangement converts machine from continuous blow to a series of short blows, preventing full pressure build-up within the core box, at any one instant. Selector switch at push button station provides choice of continuous or pulsator type blow, on the same machine.**

Standard on all "Pulsator" models

6 *"CYCLO-AIR" SAND CHAMBER*—Motor-driven agitator and aerating air circuit combine to "feed" sand to blow holes and eliminate "piping". Permits blowing any core sand mixture—delivery of 80% of each sand load to core boxes—blowing large and small cores with the same sand chamber and with equal efficiency—using fewer blow holes and vents.

Standard on all models

SAN-BLO GIVES YOU MORE MODERN IMPROVEMENTS . . . MORE FLEXIBILITY THAN ANY OTHER CORE BLOWER . . . GREATER CORE PRODUCTION, BETTER CORES AND LOWER CORE ROOM COSTS!

Never buy a core blower without first considering what you're going to get for your money! Make a list of the features you need in a core blower, for *your* core room. Get as many quotations as you wish. Then—compare item for item against your requirements, to see whether the features are available—and whether they're *standard equipment* or *extra!* You'll find that more of the features you want are standard on the SAN-BLO—extra on other core blowers. And, you'll find that the SAN-BLO incorporates *all* the modern core blowing improvements—many of which just aren't available on other machines. Take time to check every feature—you'll get more value for your core blowing dollar—and you'll get a SAN-BLO!

✦ ✦ ✦

SAN-BLO core blowing machines are available for blowing cores weighing from a few ounces to 250 lbs. each. For complete information and prices, please write our home office.

FEDERAL

San-Blo Division

The FEDERAL FOUNDRY SUPPLY Company

4600 EAST 71st STREET, CLEVELAND 5, OHIO

CHATTANOOGA · CHICAGO · DETROIT · LOS ANGELES · MILWAUKEE · NEW YORK

EUROPEAN REPRESENTATIVE: A. PH. BONVILLAIN & E. RONCERAY, Rue Paul Cotte à Chessy (S. & O.), Rail. Senlis-Paris

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

When you need more AIR

When you require additional compressed air—and available space for a compressor is at a premium—try a Fuller Rotary.

Because it is a Rotary, it has twice the capacity of a comparative horizontal-belted reciprocating unit.

Because it is a Rotary, it is singularly lacking in vibration and requires only a nominal foundation.

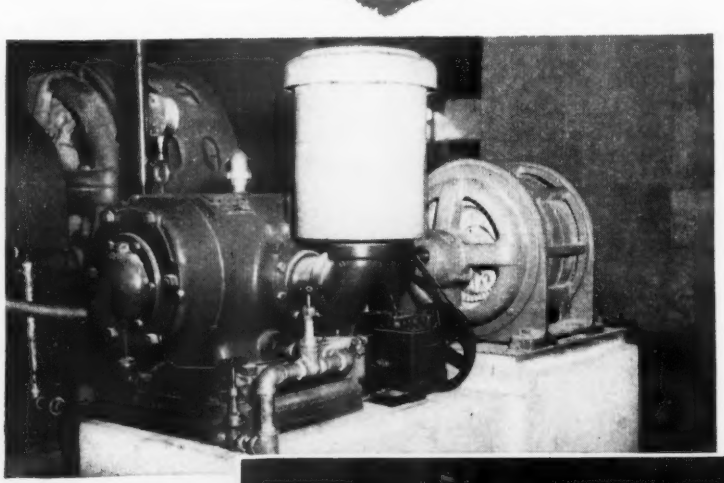
Because it operates at normal speeds, it is direct-connected and requires no cumbersome reduction gearing or belts.

Because of these things, you can put a Fuller Rotary in almost any unused corner, or on a balcony, or even suspended from the rafters, if need be.

So, whenever you are cramped for space and air, you can ease your problem by specifying Fuller.

Pressures to 125 psig; capacities to 3300 cfm.

Detailed information on design characteristics and typical applications will be forwarded promptly on request.



FULLER COMPANY, Catasauqua, Pa.

GENERAL AMERICAN TRANSPORTATION CORPORATION SUBSIDIARY

Chicago · San Francisco · Los Angeles · Seattle · Birmingham

1316
C-260

Fuller

. . . . pioneers in harnessing AIR

Fits places and budgets that no other loader can!..

Clark's new BULK LOADER

This little end-loader will do many of the things that bigger, more expensive machines can do—*plus a lot of things they can't do!* The Clark BULK LOADER has the shortest turning radius of any machine on the market—5'10". Within its capacity (11 cu. ft., 1200 lbs.), it's unbeatable for handling loosely packed material in cramped quarters—boxcars, narrow aisles, close approaches to hoppers. There's plenty of power, plenty of traction for light shoveling, with speeds up to 8½ mph in both directions. Fully loaded, the BULK LOADER will climb a 14% grade.

Bucket action is also outstanding. Low-level independent tilt-back guarantees full bucket loads every time, permits carrying in lowered position without spillage. The 60 degree dumping action has a full 76 in. clearance under the hinge, 47 in. under the lip.

Compare the performance of this new BULK LOADER against competitive machines. And remember that you'll have no service problems with this new Clark machine—parts and components are mainly interchangeable with the standard Yardlift-20. Service is immediately available from your local Clark dealer, listed in the Yellow Pages under "Trucks, Industrial."

Ask your Clark dealer for a demonstration of the new Bulk Loader. Send the coupon and we'll make the arrangements.

CLARK EQUIPMENT

Industrial Truck Division
Battle Creek 16, Michigan

☐ Send details on the BULK LOADER
☐ Contact me for demonstration

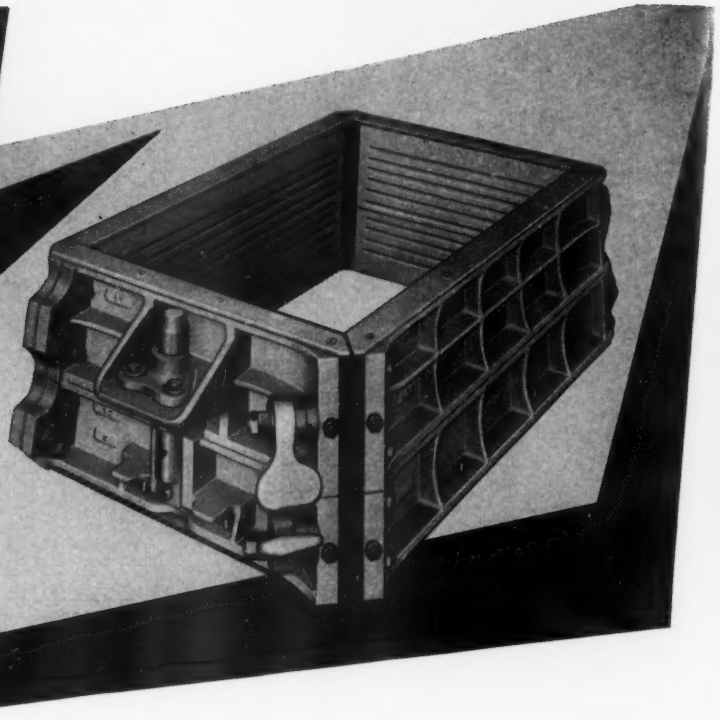
Name_____

Firm_____

Address_____

City_____

TWICE AS STRONG
A Third Lighter



—that's why magnesium is so popular for flask construction...

Magnesium has twice the tensile strength of aluminum, thus assuring longer service, and magnesium weighs 1/3 less than aluminum, making for easier handling.

FREMONT MAGNESIUM FLASKS

with their accurately machined inside surfaces and flanges and steel-faced top and bottom flanges, assure more exacting work.

THE NEW FREMONT SPREADLOCK FLASKS

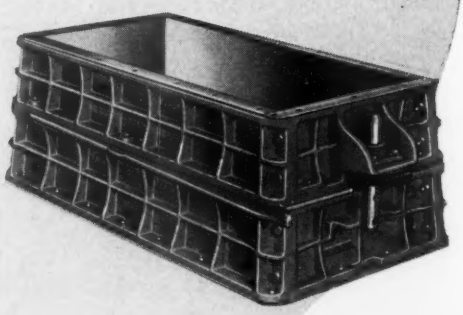
have long-life, easily replaceable, live-rubber corner inserts which completely close the corner gaps so that no sand can lodge in the open corners.

PERFECT ALIGNMENT INDEFINITELY!

is guaranteed by the one-inch GROOVLOCK FOOLPROOF PIN on

FREMONT STANDARD SLIP FLASKS

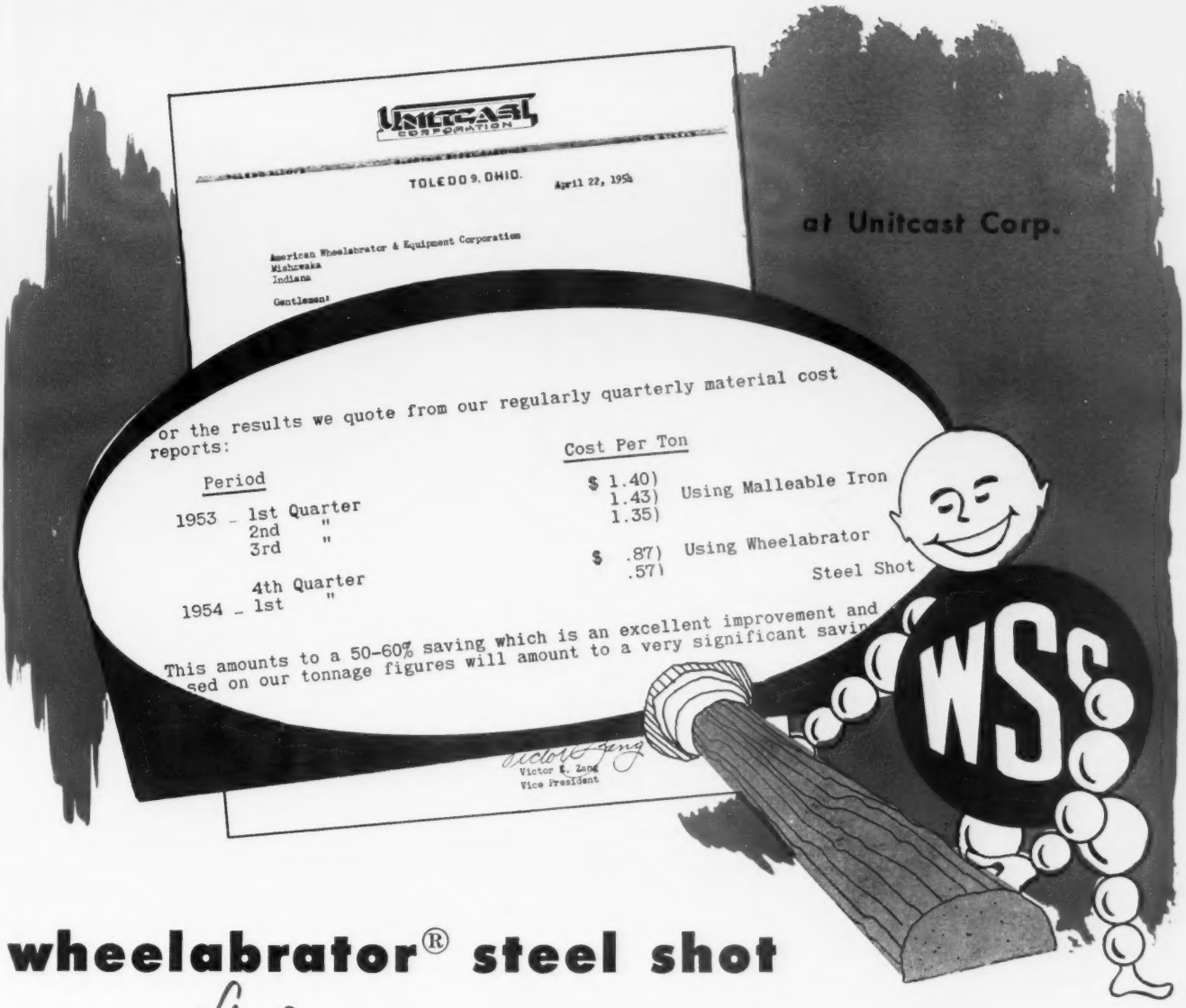
Particularly adapted to cope or drag pattern jobs. Solid, bolted and welded corner construction. Other types of standard pin fittings also available.



THE FREMONT FLASK COMPANY

FREMONT, OHIO

Write today for free literature and prices. All orders given prompt attention.


at Unitcast Corp.
UNITCAST CORPORATION
TOLEDO 9, OHIO.
April 22, 1954
American Wheelabrator & Equipment Corporation
Mishawaka
Indiana
Gentlemen:
or the results we quote from our regularly quarterly material cost reports:
Period
Cost Per Ton
1953 - 1st Quarter $ 1.40)
2nd " 1.43) Using Malleable Iron
3rd " 1.35)
4th Quarter $ .87) Using Wheelabrator
1954 - 1st " .57) Steel Shot
This amounts to a 50-60% saving which is an excellent improvement and
sed on our tonnage figures will amount to a very significant savin
Victor E. Zang
Vice President
WS

wheelabrator® steel shot *magnifies* abrasive savings 60%

Every ton of castings cleaned at Unitcast Corp. magnifies the savings this Toledo firm has made by switching from a malleableized abrasive to Wheelabrator Steel Shot.

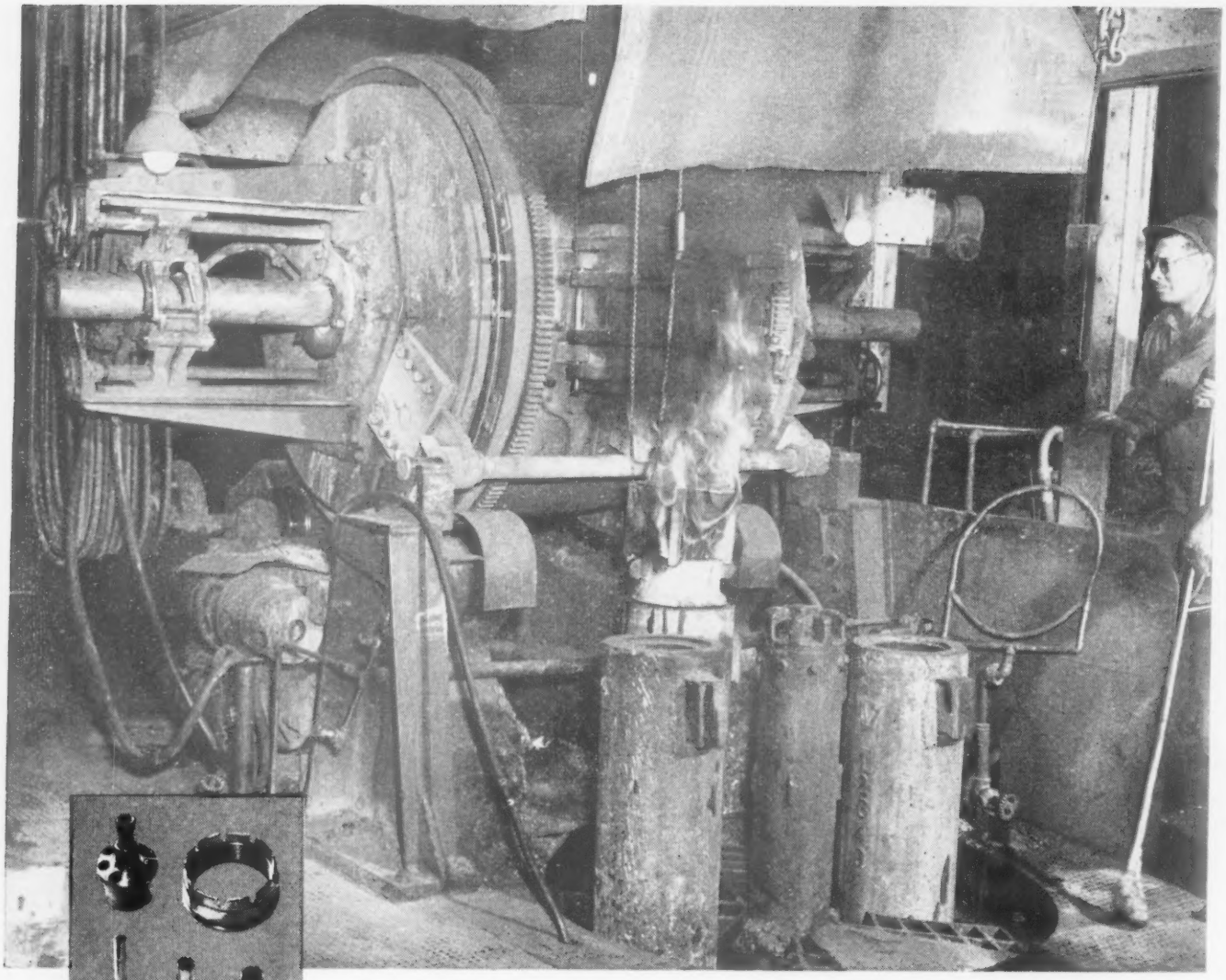
Abrasive costs per ton of material cleaned have dropped from $1.43 to 57c — a saving of 86c a ton by using Wheelabrator Steel Shot. This saving grows to $86 for every 100 tons cleaned. It means $1 spent for Wheelabrator Steel Shot buys as much cleaning as $2.50 spent for malleable iron abrasive.

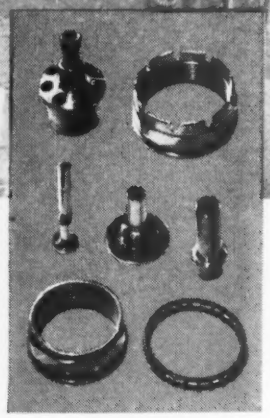
The hardness of Wheelabrator Steel Shot (42 to 50 Rockwell C), its toughness, native impact strength, and rebound properties guarantee you more for your abrasive dollar when you use this superior electric furnace steel shot. Why not try it yourself? For complete details, write for Bulletin 89-B.

American WHEELABRATOR®

trail blazer of industrial progress

AMERICAN WHEELABRATOR & EQUIPMENT CORP., 505 S. Byrkit St., Mishawaka, Indiana





Some of Mueller Brass Company's products made from DEF-melted alloys.

11 tons of copper alloy billets from this furnace every 24 hours

In this nose-tilting, 1000-lb. capacity Detroit Rocking Electric Furnace at Mueller Brass Company, alloys are changed from heat to heat. Yet it melts and pours about 11 tons of billets every 24 hours.

It's a good example of the versatility and fast-melting characteristics of Detroit Rocking Electric Furnaces. Each heat produces a billet of precisely controlled analysis. Rocking action of the furnace makes most efficient use of the heat from the indirect arc, guarantees homogeneity of metal. High quality metal means fewer rejects, better products.

Detroit Electric Furnaces, in capacities from 10 to 8000 lbs., are outstanding producers for both ferrous and non-ferrous metals. Outline your requirements and we'll give you complete information to bring new efficiency to your metal melting. Write today!

DETROIT ELECTRIC FURNACE DIVISION

KUHLMAN ELECTRIC COMPANY, BAY CITY, MICHIGAN

Foreign Representatives: in BRAZIL—Equipamentos Industrias, "Eisa" Ltd., Sau Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi Inc., 150 Broadway, New York 7, N. Y.; MEXICO: Cia Proveedora de Industrias, Atenas 32-13, Apartado 27A3, Mexico 6, D. F., Mexico; EUROPE, ENGLAND: Birlec, Ltd., Birmingham.

DELTA FOUNDRY PRODUCTS

CORE AND MOLD WASHES

FOR STEEL:
Delta Special Core and Mold Wash Base
Delta SteelKoat
Delta PyroKoat S

FOR ALL TYPES OF SAND CAST METALS:
Delta ThermoKoat
Delta Z-Koat
Delta Z Z-Koat

FOR GRAY IRON, MALLEABLE, BRONZE AND BRASS:
Delta GraKoat
Delta BlacKoat
Delta DriKoat

FOR GRAY IRON:
Delta BlacKoat S-5

FOR NON-FERROUS AND LIGHT METALS:
Delta NonferrusKoat

•

PARTING COMPOUNDS
Delta Partex
Delta Liquid Parting

•

MUDDING AND PATCHING COMPOUNDS
Delta Sliktite
Delta Ebony

•

NO-VEIN COMPOUND

•

MOLD SURFACE BINDERS — LIQUID
Delta Spray Binders

•

PERMI-BOND

•

DRI-BOND
(Dry Binder)

•

BONDITE BINDER

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LIQUID RESINS AND BINDERS
Delta 155-X Fast-Dri
Delta 168-X Fast-Dri

•

96•B SAND RELEASE AGENT
SAND CONDITIONING OIL

•

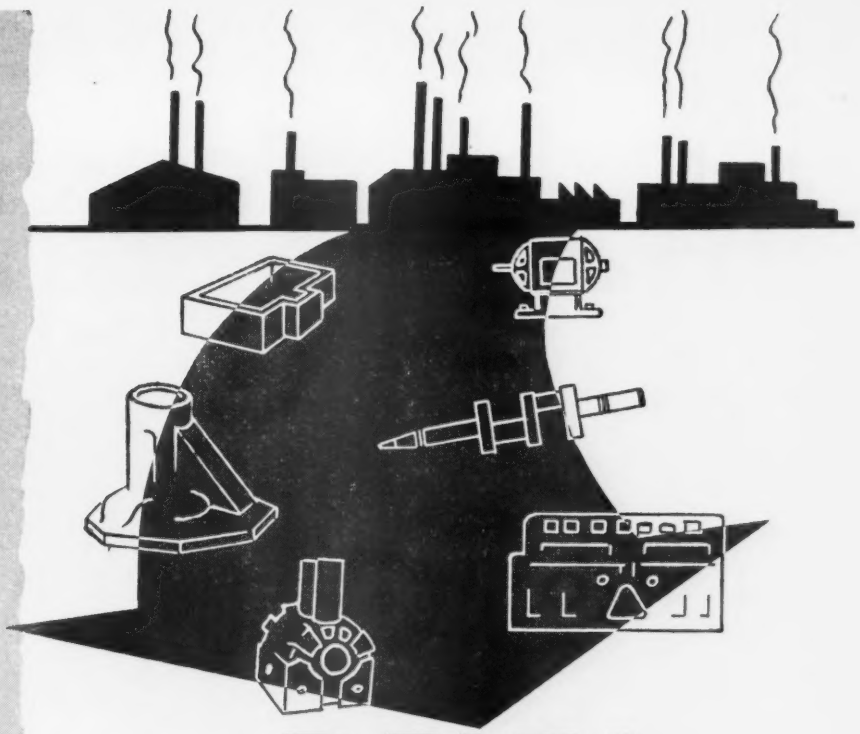
CORE ROD DIP OIL

•

CORE OILS

•

DELTA-DIETERT PROCESS BINDER 103XX
(For "D" process shell cores.)



DELTA

FOUNDRY PRODUCTS *SPEED* PRODUCTION OF BETTER, CLEANER CASTINGS AT *lower cost*

Every DELTA Foundry Product has been scientifically developed to provide more speed and greater economy in the production of finer-finished castings.

DELTA'S scientific control safeguards the higher quality and maintains the absolute uniformity of product so essential to consistently better results.

Get the Facts . . . Working samples and complete literature on Delta Foundry Products will be sent to you on request for test purposes in your own foundry.

DELTA

DELTA OIL PRODUCTS CO.

MANUFACTURERS OF SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS

MILWAUKEE 9, WISCONSIN

New 1 MODEL F

● Photos show Mr. T. E. Huston (left), Vice-President of Xenia Foundry & Machine Co. with their new No. 1 Model F Mix-Muller. Note convenient discharge mechanism and sturdy, safe sand sampler.

"Big capacity and positive mulling have reduced sand preparation time by 30%. New Simpson has eliminated facing down time and has consistently improved castings' finish," says Mr. Huston.

MIX-MULLER CUTS MULLING TIME BY 30%!

Here's an interesting report from XENIA FOUNDRY & MACHINE COMPANY, Xenia, Ohio . . . on some "gratifying gains" realized after only 6 weeks' use of their new Simpson Mix-Muller.

One of our first customers for the new No. 1 Model F Mix-Muller was W. M. Huston, President of Xenia Foundry. Mr. Huston was impressed by the compact design of the new unit . . . and its apparent suitability for his needs in producing small and medium size gray iron castings. Mr. Huston wrote us only *6 weeks* after the No. 1F was installed—reporting "excellent results" and some "particularly gratifying gains":

"Our whole mulling cycle has been cut about 30%, due to the increased capacity and the reduced mulling time. Facing down time has been entirely eliminated."

"By having a well mulled facing sand, we have been able to produce a much better casting finish. This gain has extended to our cleaning room, and an appreciable savings in cleaning time and supplies."

"Needless to say, your 1-F Simpson Mixer has corrected basic problems. We would highly recommend this unit to foundries of our size and type."

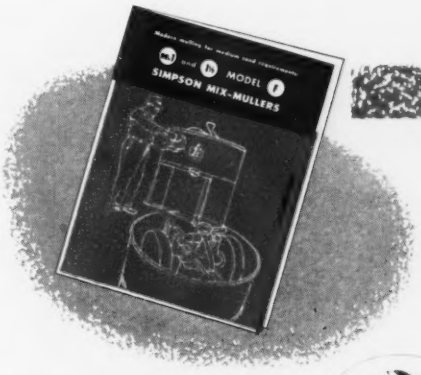
Xenia Foundry & Machine Company is just one of many progressive foundries that are daily realizing that the new F Series Simpson Mix-Mullers are the *modern* way of preparing sand . . . and are essential to present day molding practice.

There is a Simpson Mix-Muller for *every* batch capacity requirement: 50 • 250 • 500 • 1000 • 1500 • 2000 • 3000 and 4000 pounds. YOUR requirements are included—so why not write for further details? State your needs and let a National foundry engineer show you how you can attain more positive mulling for *your* money with a Simpson Mix-Muller.

WRITE FOR BULLETIN 520

This new bulletin gives details on two new Mix-Mullers—the No. 1 F and the No. 1½ F. Designed for medium capacity needs of 500 lbs. and 1000 lbs. respectively, here are a few of the plus features offered at no extra cost:

CRIB SCRAPERS • CENTRAL LIQUID ADDITIONS FUNNEL • V-BELT UNIT DRIVE • SPRING LOADED MULLERS • ANTI-FRICTION BEARINGS THROUGHOUT



National Engineering Company
(Not Inc.)
646 Machinery Hall Bldg. • Chicago 6, Illinois

NATIONAL SAND PREPARING & MOLD HANDLING SYSTEMS

SIMPSON *Intensive* MIX-MULLERS

(Advertisement)

What it takes to make a 3000 Degree Refractory Concrete

Because of the widespread interest in the use of refractory castables, many furnace operators have asked us for the story behind the performance of B&W's unique refractory concrete, Kaocast.

Here are the answers to some of the most frequently asked questions:

Q. *When you refer to Kaocast as a 3000 degree refractory castable, do you mean that its melting point is 3000° F?*

A. No, this means that its service use limit is 3000° F; its melting point is 200 degrees higher.

Q. *Just what does it take to make a 3000 degree refractory castable like B&W Kaocast?*

A. Let's first define a few terms. Refractory castables are made with granular materials which are volume stable at high temperatures and which can undergo repeated heating and cooling cycles without disintegration. These materials, known as refractory calcines or grogs, are blended with suitable hydraulic binders. The initial strength of a refractory castable is thus developed in the same manner as that of ordinary concrete—that is, through the chemical action between water and the binder. A strong *ceramic bond* is formed when the refractory castable is subjected to temperatures above the vitrification point.

Q. *Then you have a grog, a binder and a method of putting them together. Which is most important?*

A. You can't say that any *one* is most important. It's a combination of all three. Let's take them one at a time. Our grog consists primarily of the proper blend of kaolin and other alumina-silica materials. This ratio enables us to achieve a grog with minimum expansion and shrinkage, a high fusion point, and greater stability under load, at varying temperatures.

Q. *And now, what about the binder?*

A. There are a number of factors responsible for the success of the Kaocast binder. One is the compound Tricalcium Penta-aluminate (3 lime to 5 alumina). This formula produces the most refractory compound (highest melting point) that can be made from lime and alumina. Another is that by using the purest commercially available lime and alumina, the Kaocast binder is substantially free of iron and silica. Such traces of these that are present combine during the prefiring of the binder to produce stable compounds.

Q. *Just how important is the manufacturing or "blending" of the grog and the binder?*

A. If one factor could be singled out as "most important" it would be quality control.

Direct control over the fineness of materials, prefiring temperatures, and other phases of manufacture is possible at B&W because both the grog and the binder are made and blended at B&W's Augusta Works—under B&W's direct control and supervision.

Q. *These factors you've discussed must add up to some specific advantages of Kaocast. What are they?*

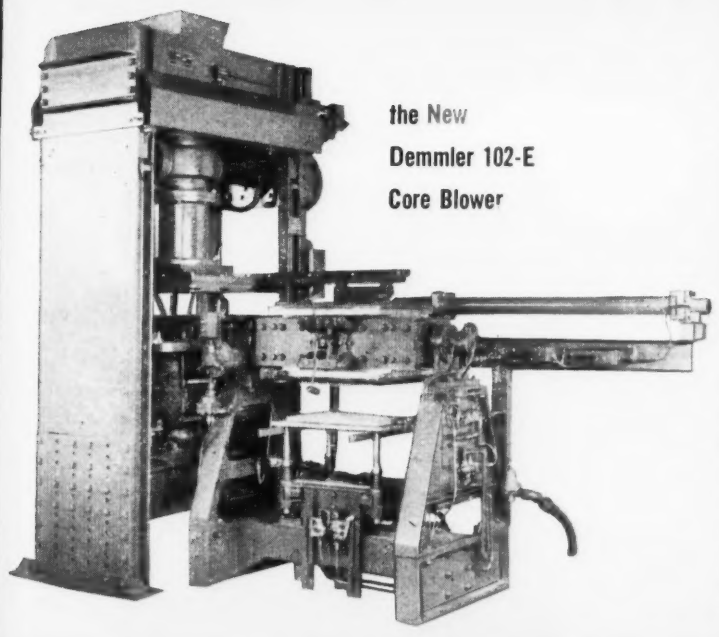
A. B&W Kaocast has all the advantages of easy installation which are responsible for the widespread interest in refractory concretes, plus these exclusive features: It is the only 3000 degree refractory concrete with high resistance to spalling and low volume change throughout its operating range.

THE BABCOCK & WILCOX CO.
Refractories Division
General Offices:
161 East 42nd St., New York 17, N. Y.
Works: Augusta, Ga.

High Core production's fine

BUT

how about Maintenance?*



the New
Demmler 102-E
Core Blower

* High production can cost money if followed by long hours of down-time. With the trend to automation in the foundry industry, down-time becomes more of a production hazard. Core blowers must offer high production AND low maintenance. Demmler core blowers hold the record for both!

Shown below is the Demmler 102-E Stationary Sand Magazine, Fully Automatic Core Blower. It has the No. 6 Demmler double core-roll-over draw machine and core box shuttle. This NEW production pacer will blow, draw, roll-over and draw cores at a production rate up to 360 per hour with one man operation!

And, for low maintenance, look at these figures kept by a Midwest foundry on all their core blowers. In a two year test Demmler machines were lowest of FOUR Types!

A CASE HISTORY

Maintenance Cost on Core Blowers

1952-1953

	Labor	Mat.	Total
Demmler Core Blower	$ 81.85	$ 44.80	$ 126.65
Core Blower "A"	85.47	141.18	226.65
Core Blower "B"	104.56	237.24	341.80
Core Blower "C"	288.07	433.33	721.40

1953-1954

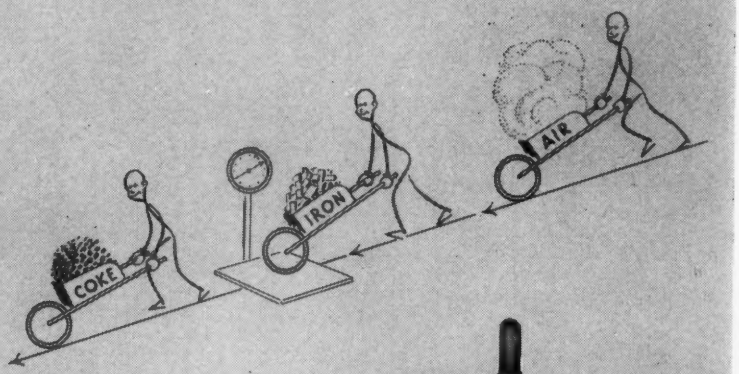
	Labor	Mat.	Total
Demmler Core Blower	$ 18.08	$ 24.89	$ 42.97
Core Blower "A"	33.28	148.84	182.12
Core Blower "B"	124.45	121.35	245.80
Core Blower "C"	149.24	228.24	377.48

Highest production and lowest maintenance

DEMMLER CORE BLOWERS

KEWANEE, ILLINOIS MANUFACTURED BY WM. DEMMLER & BROS.

Foundry costs come down

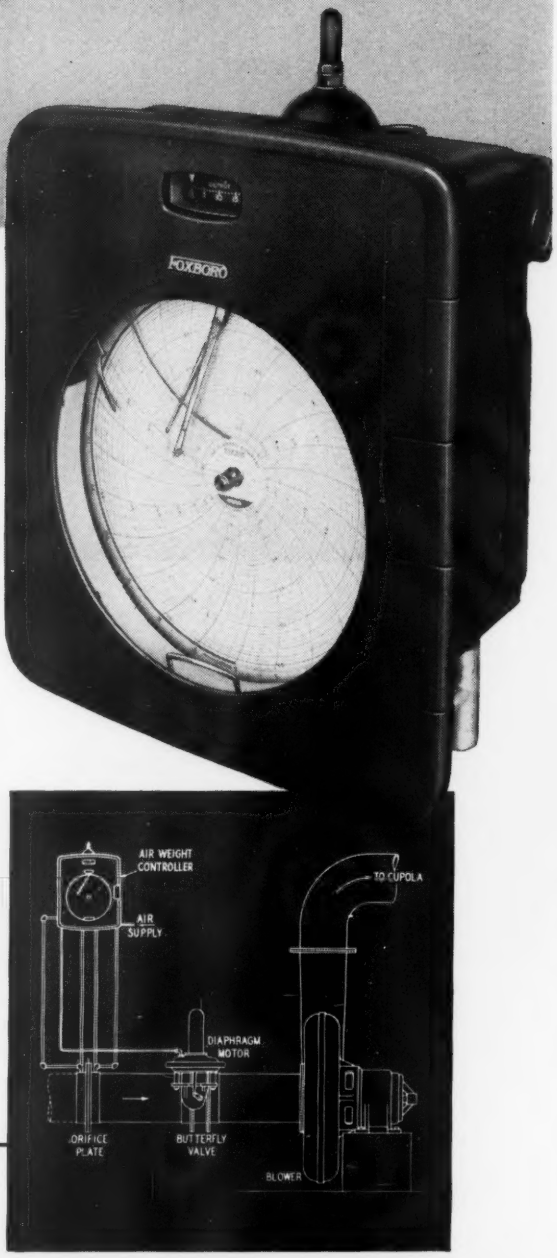


. . . when you weigh air too

Leading foundries report lower fuel costs, fewer rejects, and less pigging after installing Foxboro Air Weight Control. That's because the cupola blast is fully compensated for every change in atmospheric pressure and temperature. *The right amount of oxygen for the quantity of coke charge* insures better combustion, more uniform heats and better quality castings.

Foxboro Air-Weight Controllers automatically control cupola blast by *weight of air* instead of volume. They are one of Foxboro's many original developments in instrumentation to cut industrial costs. Representative installations will be found throughout the foundry industry. The names of those located nearest you will be gladly sent on request.

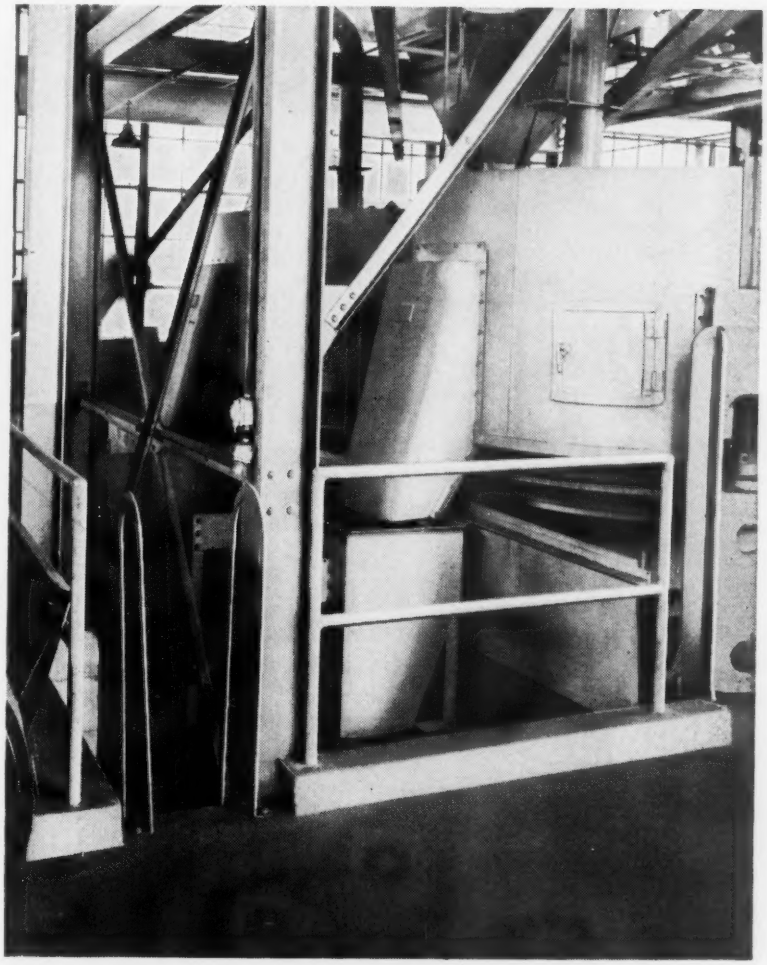
Now, . . . you can make the most of modern foundry practice by installing the advanced-design Model 40 Air-Weight Controller by Foxboro. Installation is easy and fast. Results will far outweigh the investment. Write for complete details. **The Foxboro Company, 322 Neponset Avenue, Foxboro, Mass., U. S. A.** Branches in principal cities.



Typical installation set-up of Foxboro Air-Weight Control . . . readily adaptable to either a centrifugal blower (shown in diagram) or a positive displacement blower.

FOXBORO REG U S PAT OFF **AIR-WEIGHT CONTROLLERS**

THE *Clearfield* MIXER



gives *consistent uniformity* in your sand

Automatic time controls on the Clearfield Mixer permit the use of a predetermined, uniform procedure without depending on the human element. This gives you precise control over length of tempering, quantity of bond, and all other factors—you don't have to mix sand by your operator's "instinct". The result is consistent uniformity . . . the Clearfield way. These controls may be added to any Clearfield Mixer.

Write today for Catalog No. 83. See what we mean by "A Clearfield Mixer for every need!"

CLEARFIELD MIXER mixes, tempers, aerates

CLEARFIELD MACHINE COMPANY

Clearfield, Pennsylvania, U. S. A.

Powder-washing blowpipes have replaced swing grinders and chippers in removing defects and riser pads from railroad diesel trucks. Work is done faster and more efficiently—preheating is rarely necessary.

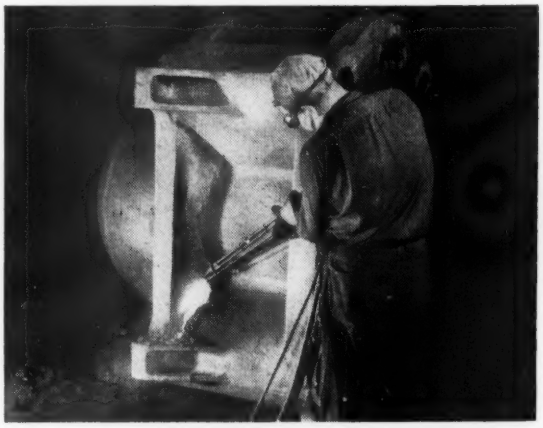
Powder-washing blowpipes remove riser pads in locations virtually impossible for other methods. Risers between flanges of this valve body have already been washed away—note the smooth clean finish.

Why Powder-Washing is a Standard Tool in Modern Foundries

Powder-washing is the fastest, most efficient method for gouging and removing fins, pads, and stubs from casting surfaces and hard-to-reach places.

* Powder-washing is faster than grinding or chipping, and finished surfaces are clean and smooth.
* Powder-washing tools are quiet, easy to operate, and less fatiguing than chipping tools and grinders.
* In powder-washing, metal powder is added to the washing flame. This raises its temperature, and provides greater speed and control in cleaning sand and metal from castings. This process is effectively used to gouge or wash iron, steel, bronze, and some of the more complex oxidation resistant alloys.

Your local LINDE representative will be glad to give you detailed information on the powder-washing process, and help you determine the setup to best serve your foundry needs. Save time and money—call him today.



LINDE AIR PRODUCTS COMPANY
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street New York 17, N. Y.
Offices in Other Principal Cities
In Canada: DOMINION OXYGEN COMPANY
Division of Union Carbide Canada Limited, Toronto

Linde
TRADE-MARK

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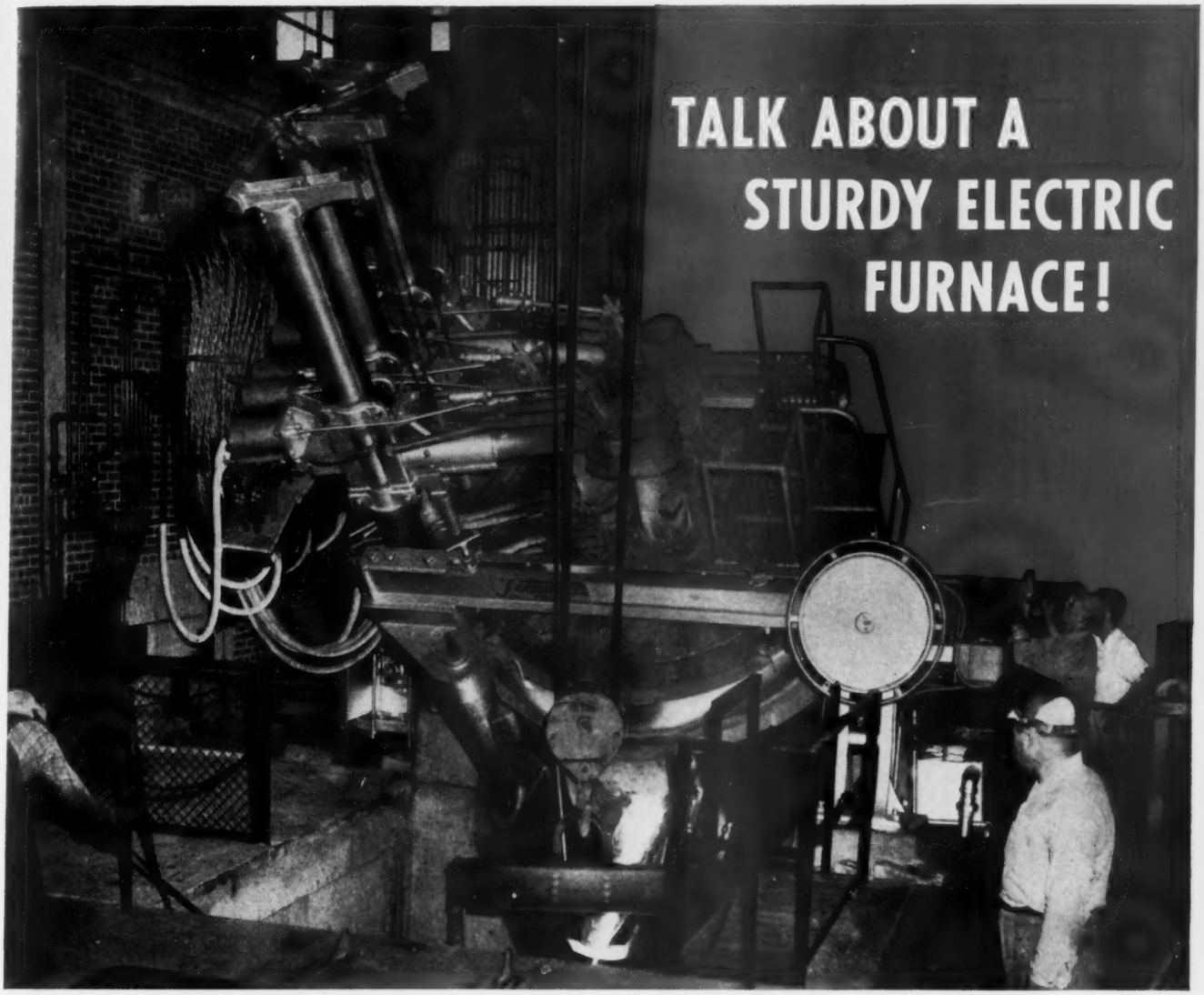


"Our old Lectromelt takes the power overload of an oversize transformer without a sign of strain to the furnace or its parts."—Duncan Foundry, Alton, Illinois

Look at the record of Duncan Foundry's durable Lectromelt*

In October 1952, this test was made on their 1½-ton per hour Lectromelt: The furnace operated steadily for 27 days, 24 hours per day, using an oversize, 2000-kva transformer. 578 heats were tapped for an average of 21.4 heats per day. Average charge per heat was 6688 lbs. Time from power-on to tap averaged 58.5 minutes per heat. Time from tap to power-on for next heat averaged 8.8 minutes. Average power consumption per ton of metal was 501 kwh.

Duncan's oversize transformer keeps metal pouring fast, but throws a jolting overload of power into the furnace to do it. Still operating under this maximum stress, their sturdy Lectromelt turns out daily heats without a sign of extra strain or wear.

Expanding recently, Duncan Foundry added another, larger Lectromelt Furnace, confident of its quality and durability.

Look for your new electric in Lectromelt's Furnace line. Write for Bulletin No. 9, describing these versatile melting, smelting, refining and reduction furnaces. Write Pittsburgh Lectromelt Furnace Corporation, 314 32nd Street, Pittsburgh 30, Pennsylvania.

Manufactured in...GERMANY: Friedrich Kocks GMBH, Dusseldorf...ENGLAND: Birlec, Ltd., Birmingham ... FRANCE: Stein et Roubaix, Paris... BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege ... SPAIN: General Electrica Espanola, Bilbao ... ITALY: Forni Stein, Genoa. JAPAN: Daido Steel Co., Ltd., Nagoya

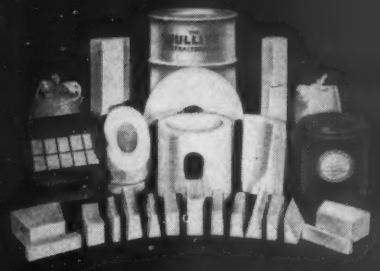
*REG. T. M. U. S. PAT. OFF.

MOORE RAPID

WHEN YOU MELT... *Lectromelt*

SHAMVA®

Since 1926
exclusive producers
of MULLITE brick,
special shapes and
specialties



designed for:

HIGHER TEMPERATURE APPLICATIONS

LONGER SERVICE LIFE

for use in:

- Direct & indirect arc furnaces
- Induction furnaces
- Open flame furnaces
- Crucible furnaces
- Cupola spouts & breasts
- Ladles
- Synthetic Mullite grain

SHAMVA Mullite brick, special shapes, ramming mixes and other specialties are engineered to your specific needs. Write for SHAMVA field engineering service.

New catalog now available

THE MULLITE REFRACTORIES CO.
SHELTON 4, CONNECTICUT

READERS' COMMENT

The Molding Sand Symposium

TO THE EDITORS:

I must congratulate you on your November issue, the Molding Sand Symposium, which deserves to be bound in leather.

Perhaps I'm slightly prejudiced, but I feel certain that these nine articles on molding sand control will be read and preserved by foundrymen all over the world, with benefits bestowed in exact proportion to the interest they excite.

HAROLD E. HENDERSON
Sand technician
H. C. Macaulay Foundry Co.
Berkeley 10, *Calif.*

●

TO THE EDITORS:

The November issue of FOUNDRY is one of the best issues of the magazine that has come forth in many months and a number of our organization have been very much interested in the articles on sands as they pertain to our industry.

I am sure that your publication would do well in giving all the available space possible on the question of molding sands, as this seems to be one of the big problems in the foundry industry.

EARL H. THOMPSON
Treasurer
H. P. Deuscher Co.
Hamilton, O.

●

TO THE EDITORS:

Congratulations for the series on Molding Sands.

JAIME RUDAS
Metallurgist
Dr. Jaime Rudas, Consultant
Calle 65, *No.* 9-37
Bogota, Colombia, S.A.

* * *

How To Eliminate Blows

TO THE EDITORS:

A question and answer in the November 1954 issue deals with the elimination of blows in making brass swivel fasteners. The problem apparently was due to metal hitting an insert and causing a blow back. In the answer portion the comment is made about the possibility of oily matter on the insert causing the trouble. In addition, it is mentioned that the solid metal must be clean and dry. This is a common opinion with regard to metal inserts but experience has apparently shown that it is not necessary for this condition to get good bonding.

One of the favorite tricks of old molders casting inserts in bronze is to dip them in "coal oil" prior to placing the insert in the mold. While at first glance this seems to be most likely to produce trouble, it invariably works in establishing a good bond between metal and insert.

Apparently what happens is that the liquid metal causes flash vaporization of the kerosene (I have never been clear whether this works as well with kerosene as it does with coal oil) causing a highly reducing atmosphere in the mold cavities so that the metal surface impinging upon the insert is free of oxidation.

Somehow I am sure that this has been described in FOUNDRY at some time or other and perhaps it is worthwhile calling it to the attention of the individual with the problem described in the November issue.

R. A. COLTON
Federated Metals Division
American Smelting & Refining Co.
Newark 5, *N. J.*

* * *

Gray Iron Specifications

TO THE EDITORS:

While reading the November issue of FOUNDRY, I noticed a query in "Questions and Answers" (p. 144, center column) regarding specifications for gray iron castings. I am enclosing several copies of the specifications prepared by this association which we consider to be the "handy list or chart" referred to by the gentleman posing the question.

DONALD H. WORKMAN
Executive Vice President
Gray Iron Founders' Society Inc.
National City-East 6th Bldg.
Cleveland 14

* * *

Safety Needs Emphasis

TO THE EDITORS:

I read your very fine article on page 77 of the December issue of FOUNDRY.

I know that you will appreciate that this is one of my pet peeves: "unsafe working conditions in foundries." In going over the December issue, I made note of the following pages: Page 93, blast room, page 95 grinding room, page 98 shakeout, pages 113, 178, 224 pouring, page 174 metal sawing, page 217 core blowing. All of these pages show your comment, "Why take chances?"

I am sure that the personal photographs on all of these pages speak for themselves, and I feel that each foundry or foundry industries should be aware of photographs of this nature, showing their workmen performing these dangerous operations with-

(*Concluded on page* 74)

Tumbles 1050 lbs. of castings in abrasive stream—TIMKEN® bearings hold drum rigid to guarantee tight seal

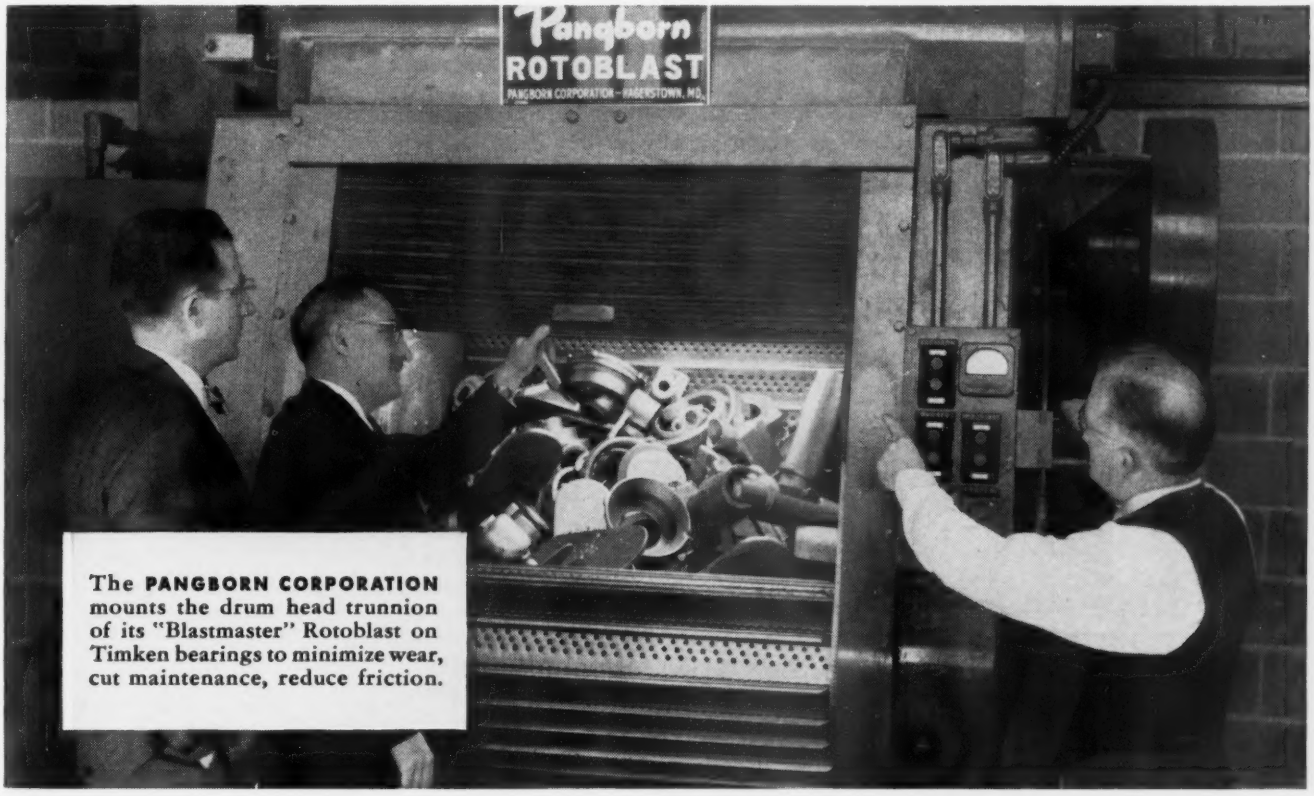
IT'S the job of the "Blastmaster" to clean heavy castings and forgings by tumbling them in a high-velocity stream of abrasive. Of course, it's important that the flying abrasive be sealed in the barrel. The answer: mount the drum head trunnions on Timken® bearings. Their tapered construction lets them take both radial and thrust loads, holding drum ends and work conveyor in rigid alignment. As a result, a tight running seal can be maintained, tiny particles of flying abrasive are kept inside the drum.

On larger Pangborn machines, these Timken bearings handle payloads of up to 4700 lbs. of tumbling castings with ease. That's because full line contact between rollers and races gives Timken bearings extra load-carrying capacity. Rollers and races are case-hardened—have hard, wear-resistant surfaces over tough, shock-resistant cores. They easily take the shock loads from tumbling forgings.

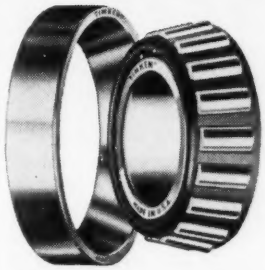
Wear is held to a minimum because Timken bearings practically eliminate friction. That's because they're designed to roll true; and because they're made with microscopic accuracy to conform to their design. And you're doubly assured of Timken bearings' quality, because we make our own steel. No other U. S. bearing maker does.

So always specify bearings stamped with the trade-mark "Timken". The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



The **PANGBORN CORPORATION** mounts the drum head trunnion of its "Blastmaster" Rotoblast on Timken bearings to minimize wear, cut maintenance, reduce friction.



TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

IT'S TIMKEN BEARINGS FOR VALUE!

To get the best value in bearings you may find this simple formula helpful:

$$Value = \frac{quality + service + public\ acceptance}{price}$$

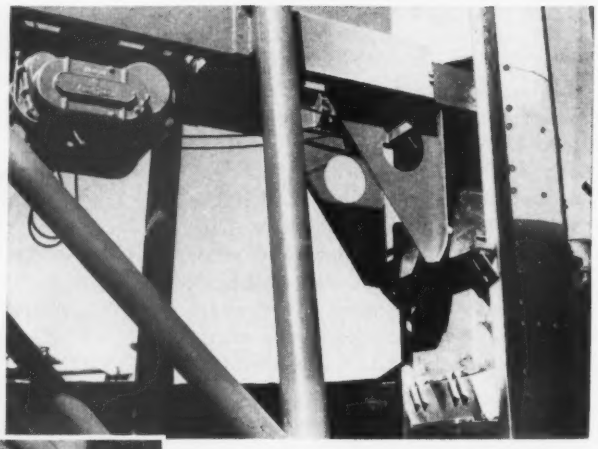
Obviously a big advantage *above* the line gives you more value than a small one *below*. No other bearing can match the uniform high quality, engineering and field service and overwhelming public acceptance you get with Timken bearings.

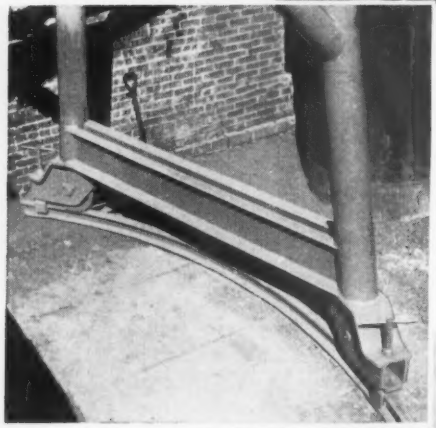
NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION

Entirely new method of

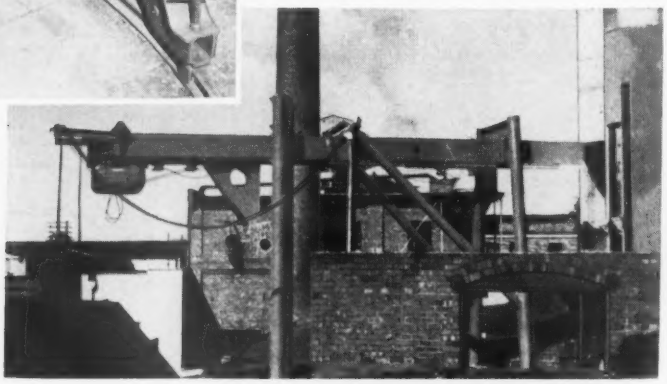
CUPOLA CHARGING

loads MORE and FASTER with LESS HELP





Three views of the Columbiana Automatic Cupola Charger: Top shows close-up of machine; left shows its mobile base; bottom shows complete setup.



The Columbiana Automatic Cupola Charger shown is capable of placing 1000-lb. charges every 1½ minutes. The machine is entirely automatic, but its movements may be controlled by an operator. Services of only two men are required for weighing and placing the charge in the charging bucket. A single control button starts the automatic cycle that lifts the load vertically 25 feet, then carries it horizontally into the cupola, where the bucket is lowered and discharged, after which it returns automatically. This machine is entirely new, but the manufacturers have several sizes available. Call or write:

MACHINE DIVISION

OF

THE COLUMBIANA PUMP CO., COLUMBIANA, OHIO

(*Concluded from page* 72)

out necessary safety glasses, instead as in most cases having it on their foreheads to protect their heads instead of their eyes. I would sincerely like to see a lot of these very simple, to-the-point illustrations corrected such as you bring out in this case. It is amazing to me that progressive companies are still working so unsafely.

At a meeting on Nov. 30 at the Auto Specialties Supervisor's Club, we were fortunate in having as our speaker the Deputy Commissioner from Lansing talk on compensation claims. I think one of the most significant points brought up during his very fine talk was a phrase: "We are not interested in what you think, it's what you know and can put down on paper so that we have a solid basis for our compensation claim allowances."

He still insists that foundries are very lax, first in their safety work and then having adequate records so that in the future two or three years from now, when a former employee or an employee presents a claim before the state, the foundry has a very simple, to-the-point record of this alleged accident. He said they are forced to base their judgment on these written facts and the amazing thing is nine times out of ten there are no facts. This again brings out the point that foundries are not thinking safely without the fact of progressing safely.

Congratulations again on this article.

W. G. FERRELL
Vice President
Auto Specialties Mfg. Co. Inc.
St. Joseph, Mich.

* * *

Kept Abreast of the News

TO THE EDITORS:

I have been receiving a copy of FOUNDRY during my hitch in the Navy. It was one of the few means that I had of keeping abreast of the industry and I feel that it will again be helpful when I enter college this winter to study foundry work.

I'd like to take this opportunity to thank you for your fine book.

BRUCE R. BARKER
Minster, Ohio

Enjoy Mr. Lawler's Letters

TO THE EDITORS:

We wish to advise you that we have enjoyed Paul Lawler's letters in "Reader's Comment." We are always interested in foundries in far off places.

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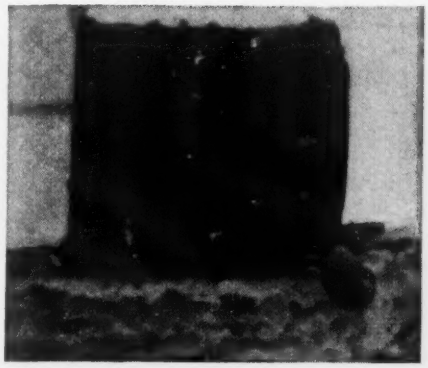

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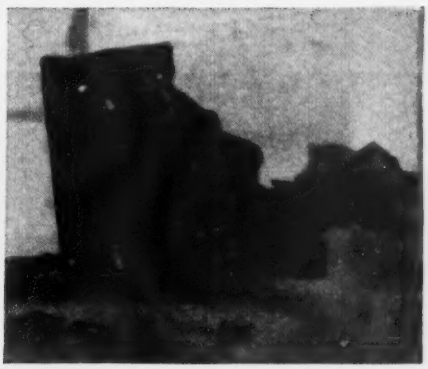

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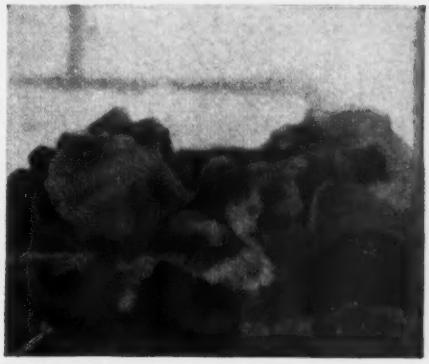

57.5 SEC.

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Partners in Progress

Tremendous changes have taken place in the foundry industry during the past fifteen years. In fact, the developments recorded in practice and product since the beginning of World War II probably exceed those of any period twice that long since castings were first produced.

The trend toward mechanization has been striking. Shortages of manpower during the war placed emphasis in that direction, and the trend has continued wherever the greater use of machines seemed advantageous. Today, the word automation is becoming quite familiar in the industry and some high-production shops have installed machines that function through the complete cycle of molding and pouring.

Only a relatively few foundries may be of the type to consider use of fully automatic machines, but many are utilizing a wide variety of new and improved types of equipment in the production of castings. Much of this has been installed during the past decade, and represents radical innovations compared with the types of machines in use not too many years ago.

In many instances, recognition of the need for this equipment has come from foundries. In fact, numerous basic ideas that have been incorporated in many of these newer machines were originated by foundrymen. But the investment in time, money, facilities and, in many cases, patience has been provided by the large number of manufacturers designing, building and supplying the mechanical requirements of castings producers. If these organizations were not willing to make these investments, if they were not anxious to serve the industry in every possible way, if they did not have vision and enterprise, it is doubtful if the foundry industry could look back over the past fifteen years with great pride in accomplishment and the knowledge that, to a great extent, its facilities are modern.

After machines of various types have been developed, it remains for the sales representatives of the various organizations to prove the advantages of application to particular production problems. Many of these men have years of experience in improving certain operations in the foundry industry, and are willing and anxious to utilize their knowledge in developing facilities and practice to make better castings at lower prices.

In our book, the foundry industry owes much to the companies engaged in the manufacture of foundry equipment, and to their many sales and engineering representatives. Without them, progress in the field of mechanical production would be ever so much slower, and it is doubtful if the foundry industry could meet the frequent peak demands for quality castings.

Frank G. Steinebach

Editor

Simplifying the

In today's market, the buyer calls the tune. To remain competitive, a company must cut its labor costs per unit of production . . . and work simplification is one way to do the job. This paper was presented before the Metals Casting Conference held on Oct. 28-29 at Purdue University

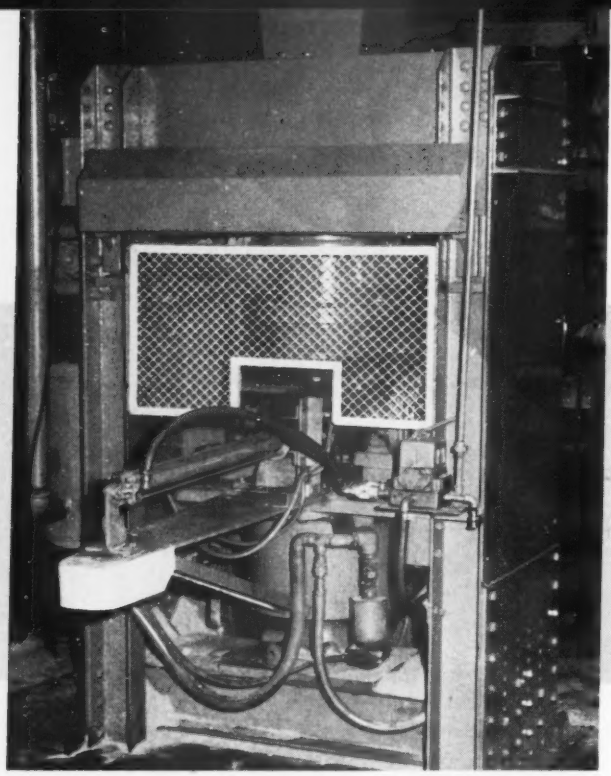
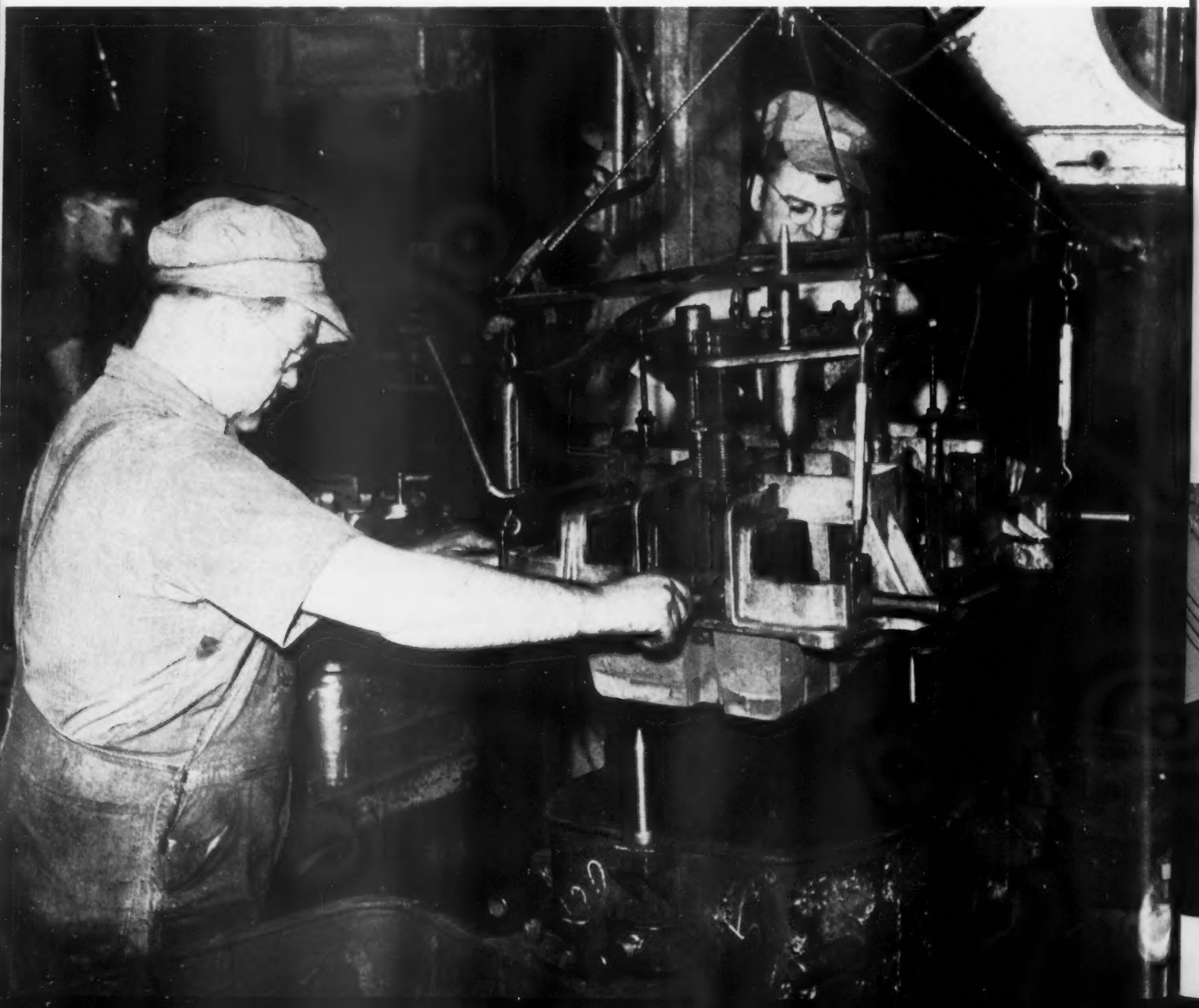


Fig. 1 (above)—Air cylinders that move coreboxes in and out of coreblowers decrease worker effort and simultaneously increase production

Fig. 2 (below)—Coresetting fixtures often can reduce effort of operators, yet improve quality



Work Can Reduce Costs

By W. C. CHEEK
Superintendent, Work Standards & Methods Engineering
Central Foundry Division, General Motors Corp.
Danville, Ill.

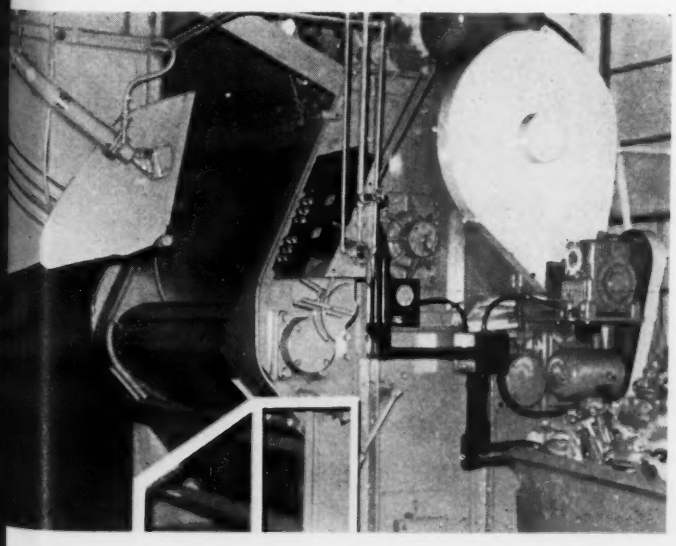
DOLLARS spent for labor today will not buy as many man-hours of work as they did a few years ago. To be competitive, industry must manufacture its products with a reduced amount of labor hours per unit. Although a worker today can be expected to do no more work than he did ten years ago, he certainly can be and is expected to be more productive. This goal is accomplished through better methods, simplified product design, new processes of manufacture, new and better machines and tools and improved working conditions.

To maintain and improve standards of quality and still remain competitive, manufacturers are adopting programs to control and reduce labor costs. Industry is beginning to realize the need for people trained in industrial engineering and capable of scientifically approaching the problem of cost reduction.

Work simplification is a term generally used to designate the process by which an industrial engineer removes effort from any operation involving human labor. It may mean elimination of ineffective movements or idle or unavoidable delay time or a reduction in manpower through changes in process. A program aimed at reducing costs through the simplification of work will be contained in two major areas, standardization and methods analysis.

Standardization—Because modern manufacturing is a repetitive process, industry has been provided jobs that are basically very adaptable to standardization. The foundry industry is no exception. Years ago a foundryman mixed sand, set cores, molded, shifted weights, poured iron and performed many other tasks. Today we have sand system operators, coresetters, molders, weight shifters and pourers, to mention only a few. Their daily tasks are very repetitive, allowing the workers to become more proficient in their work than they would be if they performed varied duties. Using time study techniques, the industrial engineer can detail and allow time for the various components of each man's job. Fig. 2 shows use of coresetting fixtures to reduce operator effort and improve quality.

Fig. 3—Use of overhead loading chute permits fast loading of airless blast machine. Bin can be filled while blast machine is in operation



By standardizing procedures and job routings of productive and nonproductive labor operations, management is working out job components that were formerly left to the worker. By detailing operations we no longer need to rely on the worker or his supervisor to develop effective motion paths. The industrial engineer is trained in this field, and it is through him that industry can make the most effective use of labor.

Standardization will not in itself guarantee quality workmanship or a quantity of production. The worker must be trained on the job and have adequate skill to perform the assignment. These requirements point out the need for more and better training of supervision and for proper job placement by management. Training of supervision is important because supervision trains the worker. A foreman can do a more effective job of training if he himself has a thorough knowledge of human relations and is experienced in the training approach.

The area of job placement is especially important in foundry work. Often a worker who is incapable of performing the job to which he is assigned may be able to do good work at a task for which he is better fitted. A man who is not able to perform heavy tasks such as molding may be capable of becoming an excellent coremaker. By keeping in close contact with the worker and making sure that he is satisfied with his work and is doing a quality job, the foreman can be a big factor in the successful establishment of standards of performance.

In our Danville plant we currently are using a program of standardization which we call Standard Time Hours. Many plants in industry have

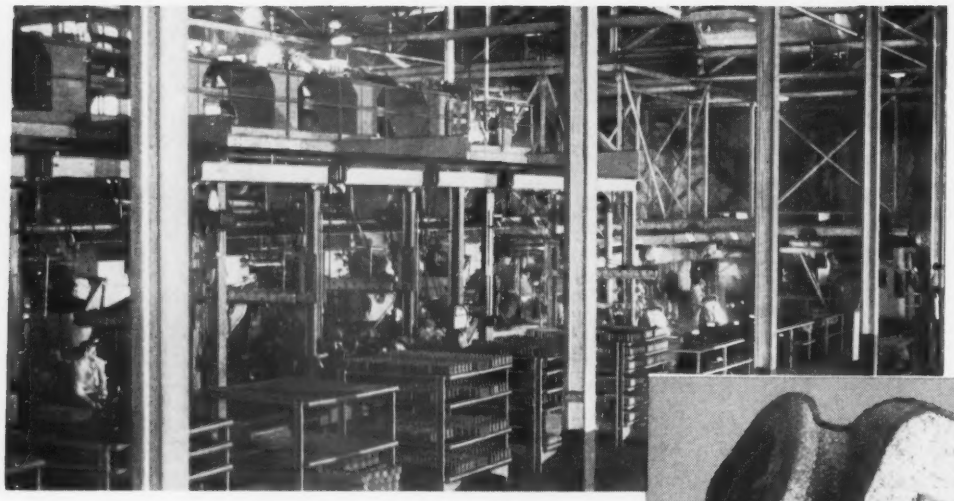
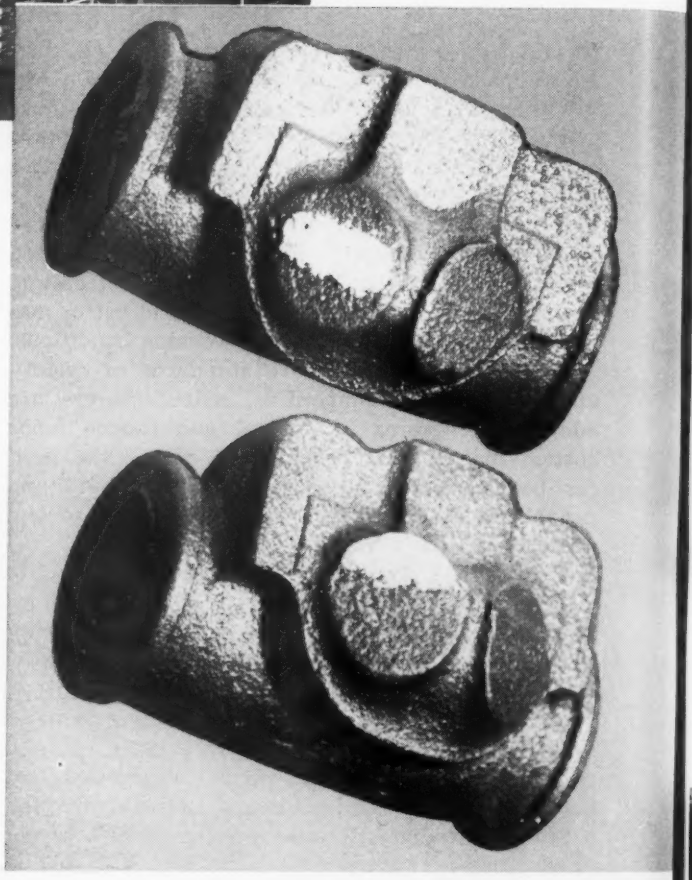
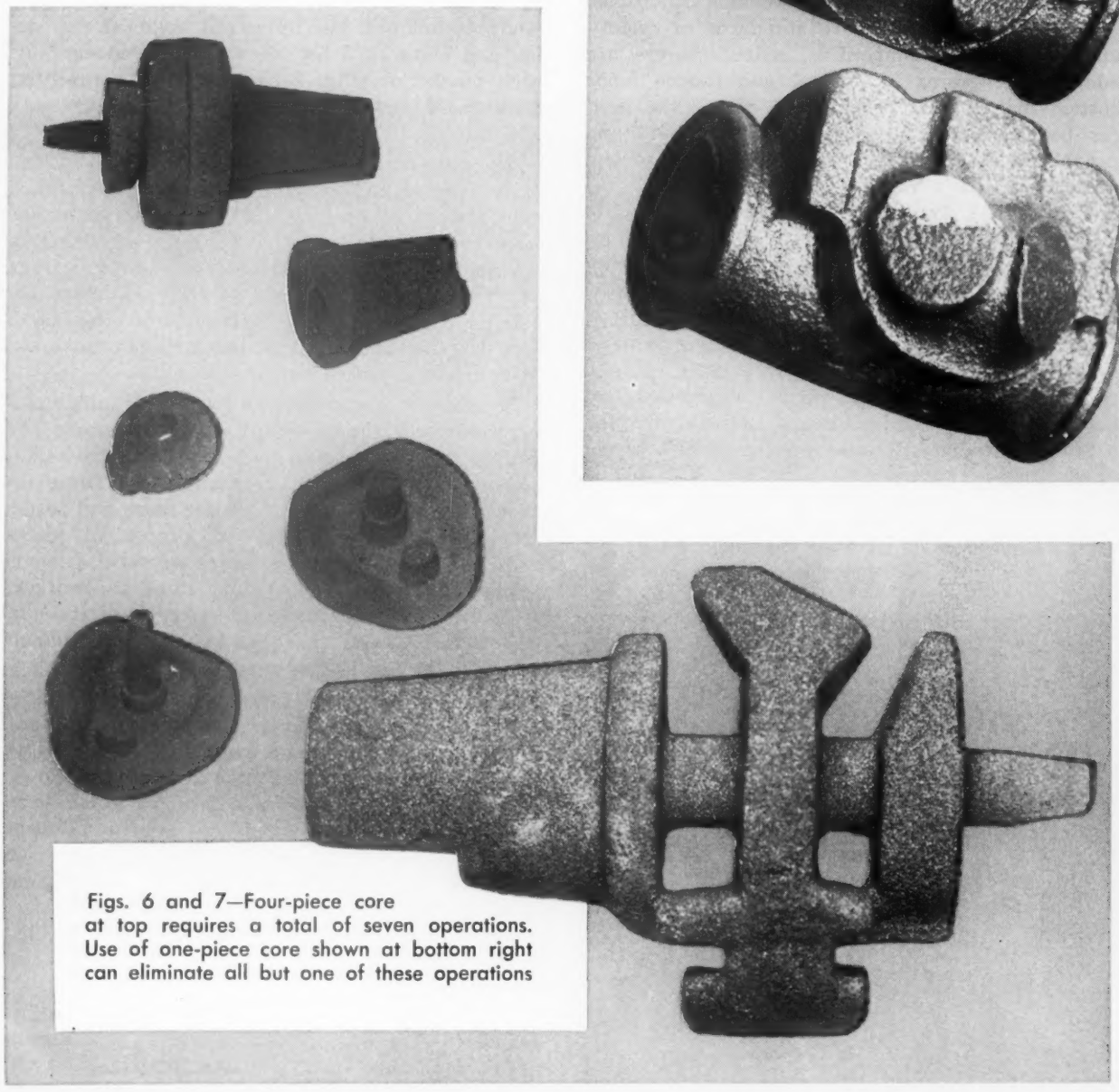


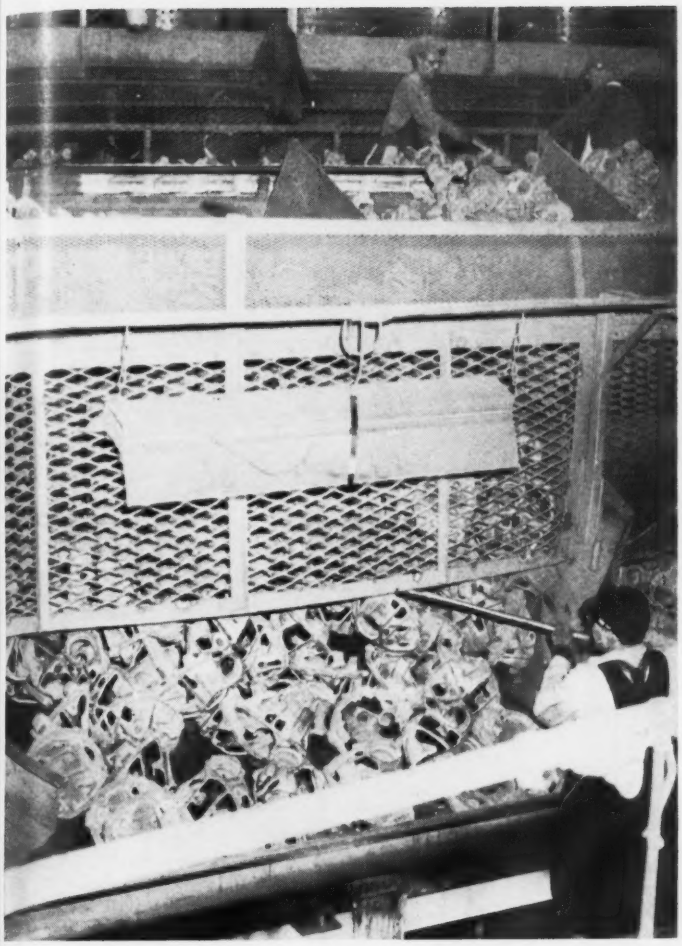
Fig. 4 (above)—Clean, orderly arrangement of working areas serves to improve effectiveness of workers and also results in higher standards

Fig. 5 (below) — Original design required a grinding operation on casting shown at top. Gate was moved to the edge in bottom casting, avoiding grinding

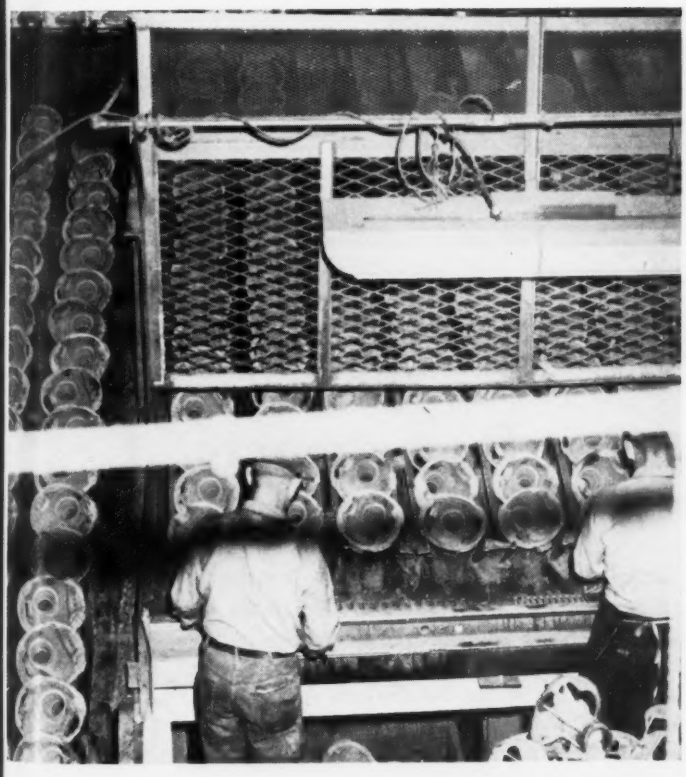




Figs. 6 and 7—Four-piece core at top requires a total of seven operations. Use of one-piece core shown at bottom right can eliminate all but one of these operations



Figs. 8 and 9—Transferring castings from sorting conveyor to bin for hard iron chipping operation. Track slides eliminate effort wasted while disentangling castingns and end breakage



used this system for years and have realized definite savings in productive labor costs through the controls it provides.

In the foundry industry, Standard Time Hours may be defined as the measurement in man-hours required to perform the operations necessary in the production of a casting. Use of a system such as this requires that all productive operations in a plant be time studied and that production standards be established.

In many areas in our industrial plants today, labor is allocated by supervision strictly on the basis of past experience, without a full analysis of job requirements. This practice is not the fault of the supervisor, for he has not been trained to see these inefficiencies. By using known time study techniques in the standardization of operations, the industrial engineer can easily show the supervisor his inefficient areas and help him to allocate manpower efficiently.

Must Plan Program Carefully

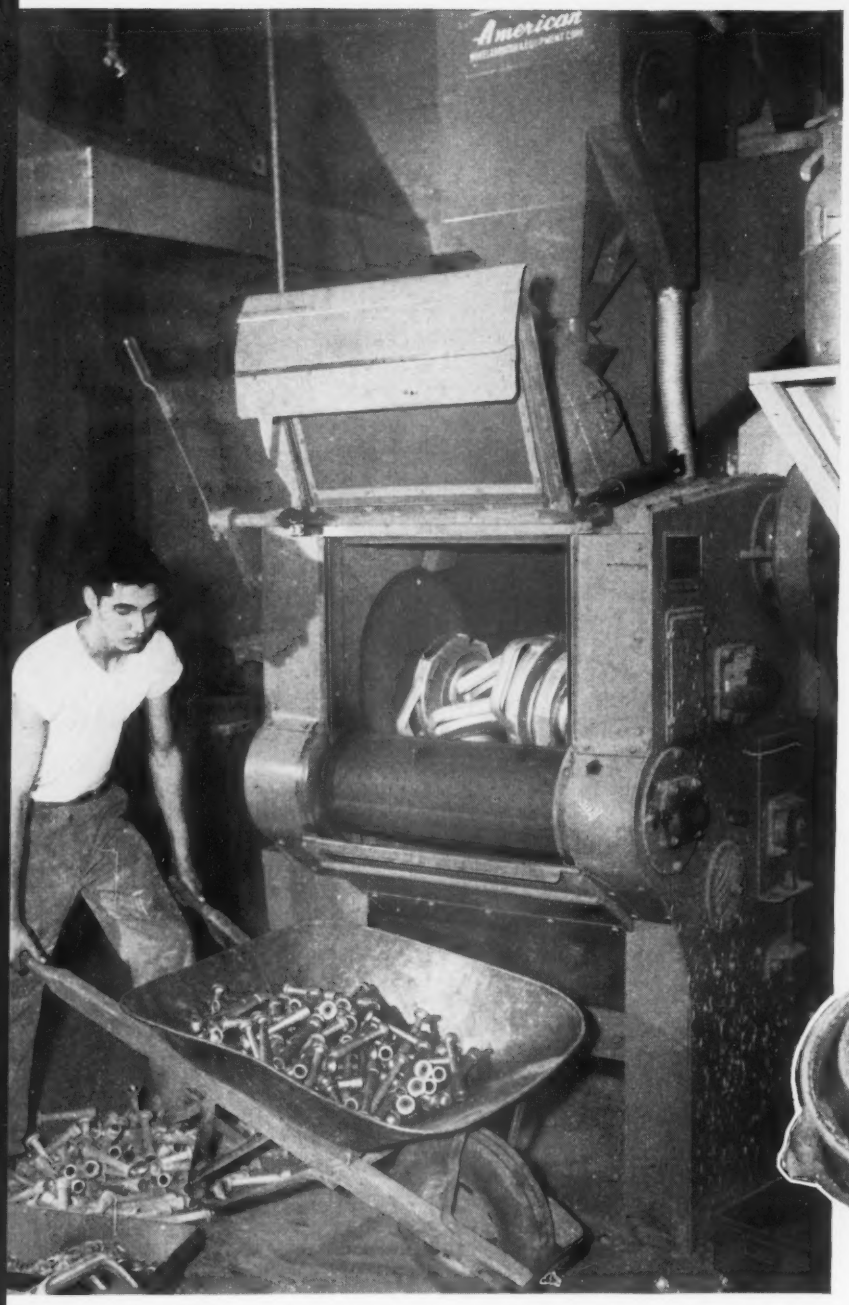
A program such as this must be planned carefully. The worker must be shown that with this type of a control he can be an effective part of the manufacture of a product without being overworked. He can expect that when he comes to work he will have a fair day of work waiting for him, rather than an undesirable day of either idleness or overwork.

Over and above providing the foreman with a tool to use in the effective allocation of manpower, Standard Time Hours is providing management with a method for controlling plant operation. By calculating the total standard hours required to manufacture a day's production of castings and comparing the result to the actual hours used, management has a check on the efficiency of productive labor.

These efficiency checks ordinarily are made in general work areas, then expanded into department and plant efficiencies. Publication of these efficiencies on a daily report will point out quickly the areas in which production is not being attained or manpower is not being used advantageously. This type of report also helps the foreman and shows him, daily, how effective his people are.

Standardization of labor operations also will provide a sound basis for pricing. In past years, the foundry industry's basis for pricing was the cost per processed ton of castings. This system undoubtedly still is used by some firms, but is not basically sound. It will not indicate where costs really are. Possibly one particular casting in a department requires excessive processing labor. This casting requires more labor per ton than another casting of comparable weight. Spreading costs on a tonnage basis will not show up this inequity. By developing labor costs with the aid of standards and on a per-part basis, we can pinpoint where our costs really are.

The labor cost for any operation on a casting may be obtained by multiplying the Standard Time Hours for that operation by the hourly wage of the worker. The pro- (*Please turn to page* 238)



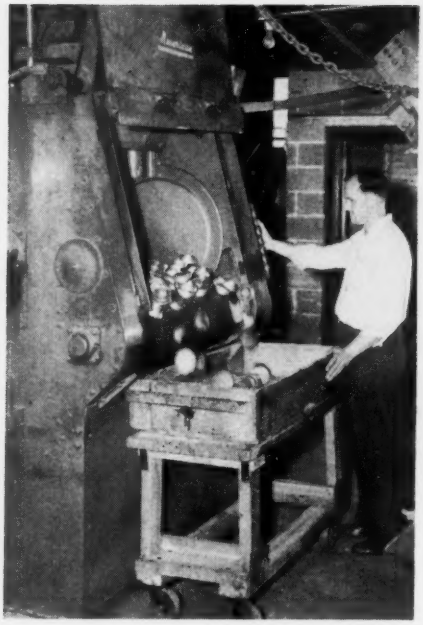


Fig. 1 (above)—View shows automatic unloading of airless blast cleaning machine with a 5-cu-ft blast chamber

Fig. 2 (left)—Wheelbarrow load of 225 brass venturi tube pump castings was cleaned in four minutes in this 2-cu-ft tumble-blast cleaning unit

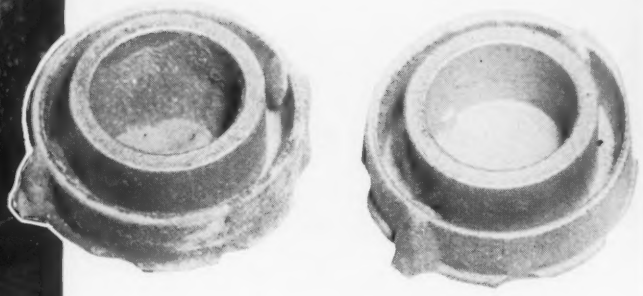


Fig. 3 (above)—Closeup shows brass "caps" (see Fig. 4) before and after cleaning in a tumble-blast machine

Small Foundries Can Afford Better Cleaning Departments

To maintain competitive positions, small foundries often need modern, automatic equipment more than large ones. The author describes some of the advantages that accrue from installation of a modern cleaning room

By EUGENE F. ANDERSON
Special Engineer
American Wheelabrator & Equipment Co.
Mishawaka, Ind.

Fig. 4—About 125 of these brass "caps," shown in closeup in Fig. 3, are cleaned in five minutes' time in tumble-blast machine. Part is 3 in. OD and 1 in. thick

Fig. 5—Unloading swing-table type automatic airless blast unit with a simple chain hoist

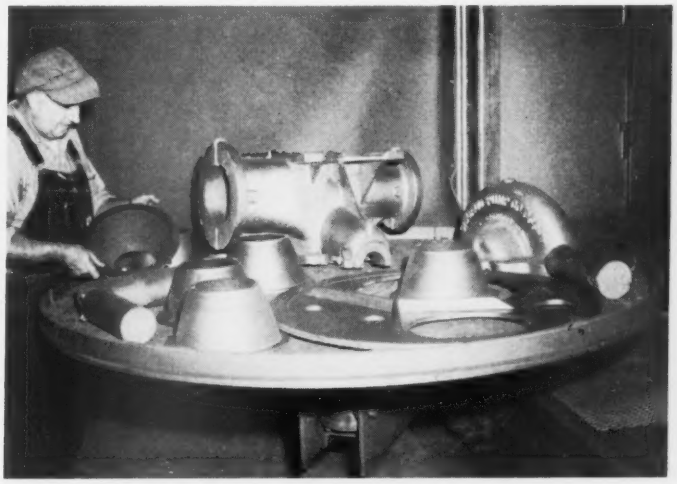


Fig. 6—Closeup of cleaned parts in Fig. 5. Cleaned in seven minutes, they weigh 773 lb

WHETHER large or small, a progressive foundry should have a policy of mechanizing itself as time goes on. Although all facets of a foundry operation need attention in this regard, most foundries find that the cleaning room is one of the key areas for installing automatic equipment because of the frequency of plant bottlenecks there.

Until recently, however, large foundries did most of the mechanizing of cleaning rooms. Small foundries stood back, in the mistaken belief that automatic equipment could not be justified in their own plants on a basis of small volume of production and/or a wide variety of castings. As a result, a large number of small foundries operated with old and inefficient equipment while the large ones became modern and highly efficient. This condition did much to reduce the competitive position of small foundries seeking jobbing work. Small foundries many times need automatic and modern equipment more than large ones, to maintain a competitive position.

Some small foundries did pioneer a few years ago in the adoption of automatic abrasive blast cleaning equipment. Their results showed that small foundries can afford to modernize and that often the very livelihood of the business actually depends upon their doing so. Since then, the trend toward mechanization of cleaning rooms in small foundries has accelerated sharply.

Advantages of mechanization in this respect are several. Sales position improves greatly since a shop is able to make faster deliveries because of both faster cleaning and elimination of work backlogs. These results have (*Please turn to page* 246)

By E. A. LORIA
Senior Engineer
Metallurgy, Research & Development Dept.
Carborundum Co.
Niagara Falls, N. Y.

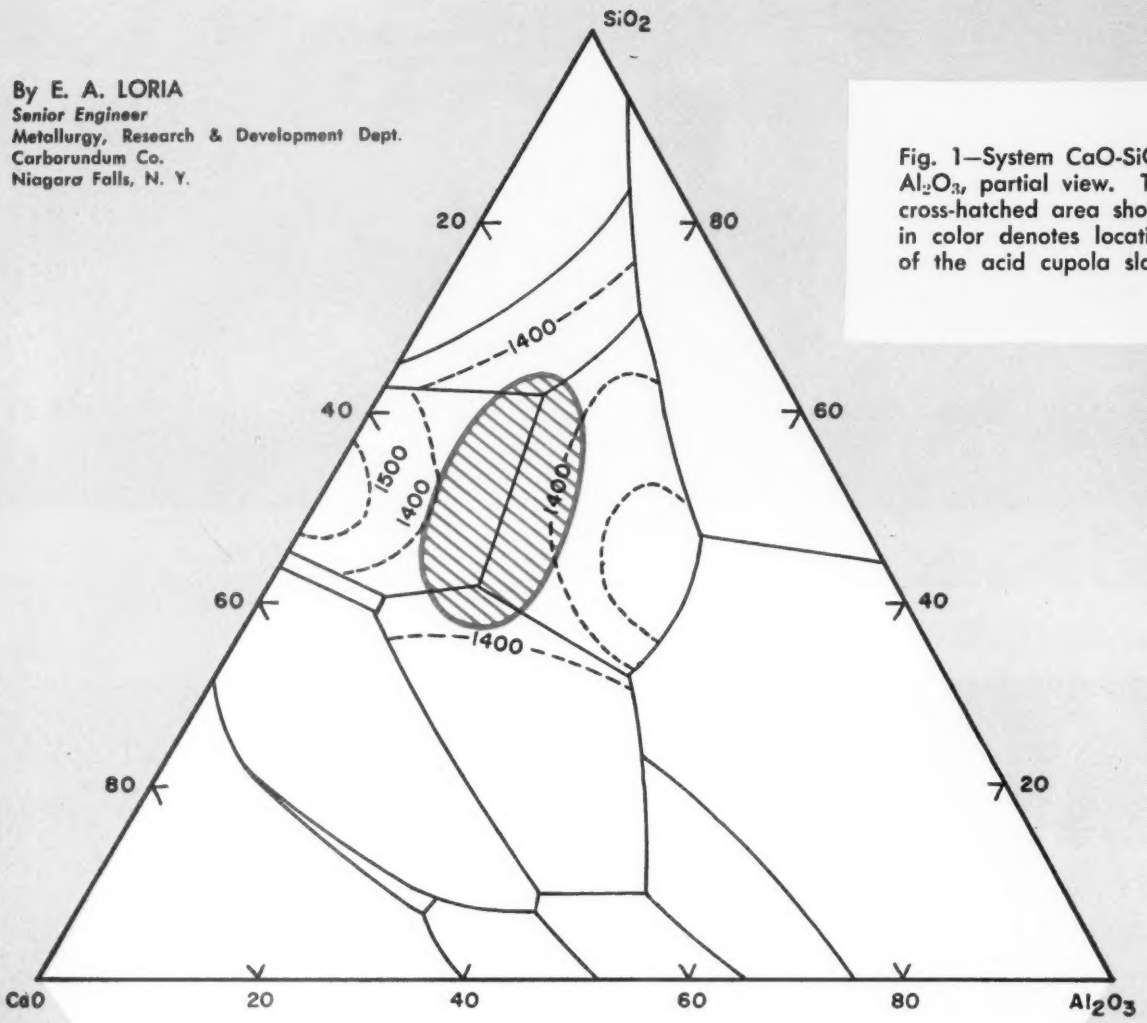


Fig. 1—System CaO-SiO_2-Al_2O_3, partial view. The cross-hatched area shown in color denotes location of the acid cupola slags

Importance of Slag Control

In Acid Cupola Operation

Effects of different slags upon metal composition require that cupola melting techniques be under control. Such control demands an understanding of the role of slags

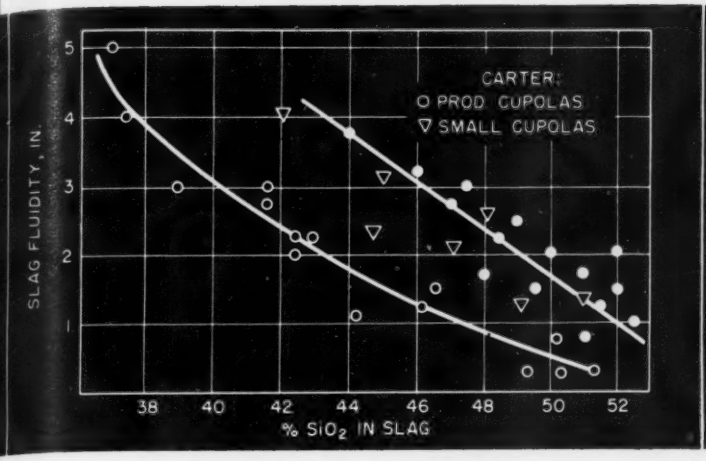


Fig. 2—Relation of silica content to slag fluidity as shown by viscosimeter. Dots represent the present study

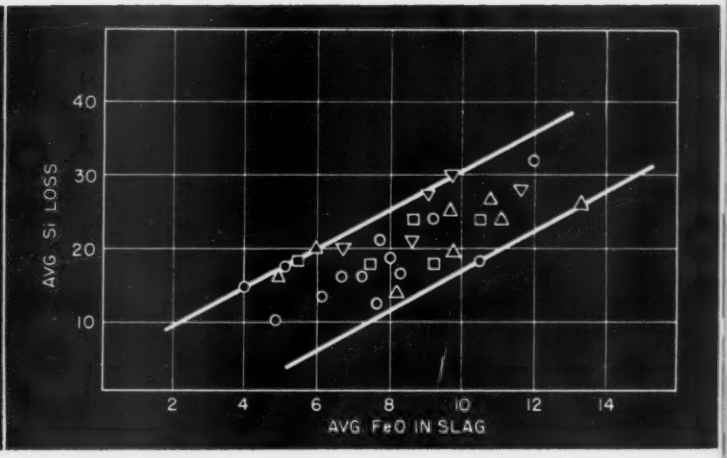


Fig. 3—Chart shows the relation of iron oxide in slag to the silicon loss in cast iron

CUPOLA slags consist primarily of refractory oxides mixed together by fusion. The oxides found in almost all slags are those of lime, silica, alumina, magnesia, iron, manganese and phosphorus. Sulphides and calcium carbide also may be present. In the solid and even in the liquid state, these compounds exist as mixtures of simple and combined oxide complexes.

The chemical composition is in part a function of the temperature of formation in the cupola. It covers a fairly wide range, dependent upon melting procedure and type of iron produced. The effect of different slags upon metal composition is probably the most important aspect of slag-metal reactions in the cupola. The need for close analysis control in the production of quality cast iron demands that cupola melting techniques be under control. Successful control requires an understanding of the role of slags during melting.

Generally speaking acid-cupola slags belong to the ternary system, lime-silica-alumina (CaO-SiO_2-Al_2O_3), and reference should be made to the region where cupola slags usually occur if one is to study their fusion temperatures. This portion of the diagram, shown in Fig. 1, has two eutectics, one at 1265° C and the other at 1170° C, and the contours of the isotherms about these eutectics should be noted especially. Acid cupola slags tend to orient themselves around the particular analysis range denoted by the cross-hatched area.

Changes in the basic constituent, CaO cut across isotherms sharply, whereas changes in the acid constituent, SiO_2, produce compositions which run parallel to the isotherms and in the direction of the second eutectic. Consequently, a slight increase in silica still would produce fluid, eutectic-type slag. Of course, degree of superheat and lowering of the iron oxide content would have to be taken into consideration in any comparative study of such slags.

An explanation of the relation of slag temperature to the course of slag-metal reactions has been set forth by Witten[1]. It is essentially similar to that proposed by Fitterer[2] for the saturation of acid steel slags with silica at various temperatures and the changes in slag composition that can result. It can be used as a working hypothesis, although it is hampered by heterogeneous reactions between slag and metal which proceed more slowly than homogeneous reactions within the metal phase alone.

To hasten such reactions, adequate mixing of slag and metal must occur. This step is best accomplished by creating turbulence (activity) and adjusting the fluidity of the slag. The most important slag-metal reactions involving oxidation and desulphurization are significantly affected by the melting point of the cupola slag mixture, its basicity ratio and its temperature.

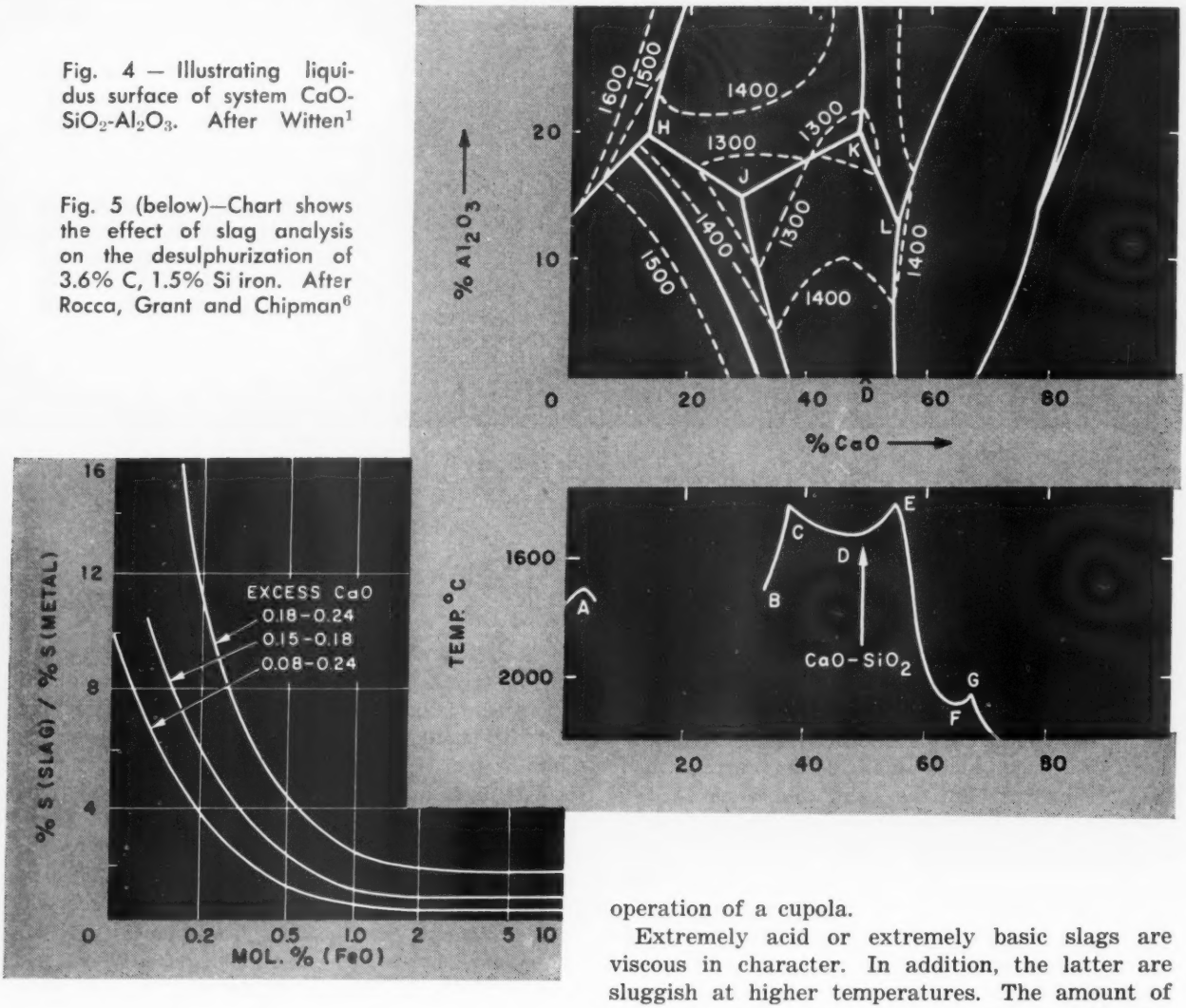
Alumina and magnesia alter the melting point of the lime-silica base mixture without, however, like iron and manganese undergoing significant reaction with the metal bath. For this reason, their quantity in the slag remains constant. Since they do occur in major and variable concentrations in acid cupola slags, the lime-silica ratio cannot be the sole factor in the interaction between slag and metal, and their influence upon the melting point must be acknowledged.

The quaternary system, lime-silica-alumina-magnesia, is so imperfectly known that it is necessary to employ the better known lime-silica-alumina ternary system as a starting point. A top view of the liquidus surfaces of the phase diagram of this system, together with a downward projection of the contiguous binary system, CaO-SiO_2, is shown in Fig. 4. The low melting points of the ternary eutectics are noteworthy since such slag compositions exert a decisive influence upon the interaction of slag and metal in the cupola.

Slag Characteristics—Slag control by visual inspection of pancake samples can be analogous to the use of chill tests for metal control. Operational difficulties arising from the use of excessive air

Fig. 4 — Illustrating liquidus surface of system CaO-SiO_2-Al_2O_3. After Witten[1]

Fig. 5 (below)—Chart shows the effect of slag analysis on the desulphurization of 3.6% C, 1.5% Si iron. After Rocca, Grant and Chipman[6]



or large quantities of rusty scrap in the cupola can be detected readily since the slag turns black. Slag color can be a useful criterion of cupola operation since various slag constituents affect it. A high iron-manganese oxide slag is dead-black, greenish or brown. A high lime-magnesia slag has a gray or whitish appearance, whereas slags deficient in these basic oxides are dark gray. The fracture luster of slag samples seems to be a good measure of slag basicity.

As cupola slags become more basic, the luster changes from the glassy fracture of strongly acid slags to a dull or stony fracture characteristic of basic slags. For acid slags, surface color is a satisfactory indicator of the iron oxide content of the slag. Low iron oxide contents often result in viscous slag, but the figure should not exceed about 10 per cent as a general rule. As the iron oxide increases, a gradation in color from light green to dark green, glassy black to matte black (very high iron oxide) occurs. Good slag is brittle, olive green in color, with a creamy incrustation.

The slag characteristic that probably governs the largest number of reactions in the cupola is the degree of slag viscosity. Slag composition, through its effect on fluidity, can influence the general operation of a cupola.

Extremely acid or extremely basic slags are viscous in character. In addition, the latter are sluggish at higher temperatures. The amount of iron oxide in a slag is an important variable, for it can increase fluidity of the higher silica slags. When present in excess, however, this basic oxide reacts with the silica lining and causes more erosion.

A fluid slag allows the iron to absorb carbon, improves melting rate and temperature, prevents excessive oxidation of silicon and gives a clean drop. For very viscous slag compositions, higher temperatures are required to achieve a good, fluid slag. Generally, the fluidity of acid slags is at a maximum when lime content is about 25 per cent.

Silica is the largest single constituent in acid cupola slags and hence produces a major influence on slag fluidity. All basic slag constituents appear to increase fluidity, but that property seems to correlate better with the silica content than any other single constituent or group of them. In fact, correlation with silica content is equivalent to correlation with the total content of all basic constituents. Extending the data presented recently by Carter[3] gives the relation of silica content to fluidity shown in Fig. 2.

Measurements were made in the Herty viscosity mold held directly under a steady slag stream. With the silica content as high as 52 per cent, slag fluidity drops to around 1 in., whereas with the low silica content of 42 per cent, fluidity increases to about 4 in.

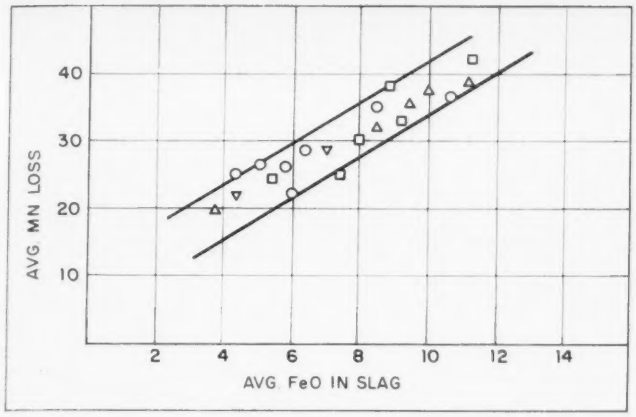


Fig. 6—Chart shows relation of iron oxide in the slag to the manganese loss in cast iron

TABLE I—Relation of Oxygen in Metal and Slag for Cast Irons Melted in Small Cupola under Different Operating Conditions

Heat	Tap	Metal Analysis, Per cent by Weight TC	Si	CE	O_2	H_2	N_2	Slag FeO
1	6	3.24	2.12	3.95	0.0017	0.00023	0.008	3.47
	10	3.26	2.04	3.94	0.0037	0.00038	0.012	4.50
	17	3.25	2.01	3.92	0.0020	0.00018	0.007	7.75
	21	3.34	1.92	3.98	0.0013	0.00020	0.007	11.30
	Avg.	3.27	2.04	3.95	0.0022	0.00025	0.009	6.76
2	6	3.23	2.28	3.99	0.0012	0.00011	0.007	3.67
	9	3.21	2.29	3.97	0.0013	0.00019	0.007	3.73
	17	3.34	2.23	4.08	0.0017	0.00015	0.010	4.17
	21	3.32	2.12	4.03	0.0021	0.00011	0.011	4.75
	Avg.	3.28	2.23	4.02	0.0016	0.00014	0.009	4.08
3	6	3.18	2.08	3.87	0.0023	0.00033	0.007	4.29
	9	3.17	2.03	3.85	0.0015	0.00033	0.008	5.69
	13	3.16	2.07	3.85	0.0036	0.00056	0.007	5.93
	17	3.21	2.06	3.90	0.0021	0.00027	0.006	5.14
	21	3.28	1.90	3.91	0.0015	0.00026	0.007	9.05
	Avg.	3.20	2.03	3.88	0.0022	0.00035	0.007	6.04
4	6	3.07	2.13	3.78	0.0028	0.00023	0.007	8.49
	9	3.09	2.14	3.80	0.0020	0.00020	0.008	11.50
	13	3.08	2.15	3.80	0.0016	0.00046	0.007	10.00
	17	3.15	2.24	3.90	0.0029	0.00015	0.007	9.80
	21	3.27	2.06	3.96	0.0016	0.00026	0.009	10.50
	Avg.	3.13	2.14	3.84	0.0022	0.00026	0.008	10.07
5	9	3.34	1.40	3.81	0.0021	0.00022	0.008	11.50
	13	3.30	1.30	3.73	0.0046	0.00030	0.007	16.40
	16	3.34	1.39	3.80	0.0021	0.00029	0.006	13.50
	19	3.43	1.48	3.92	0.0015	0.00018	0.008	14.70
	Avg.	3.37	1.40	3.82	0.0026	0.00025	0.007	14.00
6	9	3.24	1.53	3.75	0.0020	0.00009	0.009	11.70
	13	3.21	1.33	3.65	0.0021	0.00037	0.013	10.90
	16	3.39	1.32	3.83	0.0020	0.00016	0.007	8.35
	19	3.35	1.32	3.79	0.0019	0.00022	0.009	9.57
	Avg.	3.31	1.41	3.78	0.0020	0.00021	0.009	9.63

Heats 1 and 2—Good operating conditions in 10-in.-diam cupola. Heats 3 and 4—Low tapping temperature and high degree of oxidation; lowered blast temperature and increased blast volume. Heats 5 and 6—Greater degree of oxidation; use of lightweight, rusty scrap and low bed height.

These results for production cupolas parallel those obtained by Carter on his small, experimental cupola, the higher level of fluidity for the same composition being produced by the larger stream of slag that gets into the mold more forcefully and with less heat loss. In these slags, alumina gives more evidence of behaving as a base and increasing fluidity. The range in results for the same silica content probably is produced by variations in the alumina and/or other oxide contents altering the melting points of the different slag compositions.

The effect of slag basicity upon the chemical composition of the metal is probably the most important aspect of slag-metal reactions. In turn, the metal chemistry determines many of the physical and casting properties. As far as we know, no systematic study of the effect of slags upon the microstructure and mechanical properties of cast iron has been made. Information available in the literature is fragmentary and in some cases contradictory with respect to acid slags possessing slightly different lime-silica ratios. For markedly different ratios, such as in a comparison of acid and basic slags, direct evidence of the effect of slag basicity is available.

When melted with a basic slag, cast iron is higher in carbon and lower in silicon and sulphur. Under comparable conditions, lower carbon and higher silicon and sulphur contents result with an acid slag. In effect, a change in the basicity ratio of the slag produces a change in the composition of cast iron; hence chill depth and mechanical properties vary accordingly.

When irons of similar carbon and silicon contents are compared, these properties are similar regardless of whether melting was done under an acid or a basic slag. Thus, slag basicity in itself has no direct effect on the properties of cast iron, but indirectly, by changing metal composition, it does produce significant changes. Indeed, the ultimate modification of the iron composition is largely a result of careful manipulation of the composition of the slag.

Recent trials in the same acid-lined and then basic-lined cupola, by Piwowarsky and Schmidt[4], following comparable melting conditions, confirm the opinion that the most important difference between the processes is in the working of the slag. In their acid cupola there was 50-60 per cent silica in the slag with 24-30 per cent lime, whereas in the basic practice, the silica content of the slag was 31-34 per cent with 33-40 per cent lime.

Earlier, Piwowarsky pointed out that in acid cupola operation the slag scarcely could contain more than 0.15 per cent sulphur.

The present work has fully confirmed this contention, for the acid slags contained from 0.08-0.13 per cent sulphur and the basic slags from 0.5-0.8 per cent. In acid practice, the sulphur in the iron was 0.09-0.10 per cent, but in basic practice it was lowered to 0.05 per cent. With gray iron melts, it was found that twice as much silicon was lost in the basic cupola, and the manganese loss was much less than with an acid lining.

Oxidation—Because the iron oxide content of the slag is an indication of the oxidizing conditions in the cupola, it can be related to the oxidation losses of silicon and manganese. These relationships are shown in Fig. 3 for a number of commercial irons melted in the acid cupola. As iron oxide in the slag increases, so does gross silicon loss. For example, Fig. 3 shows that a slag containing 6 per cent FeO was accompanied by an average 13 per cent loss of Si. With 11 per cent FeO in the slag, about a 25 per cent loss of Si occurs. (*Please turn to page* 240)

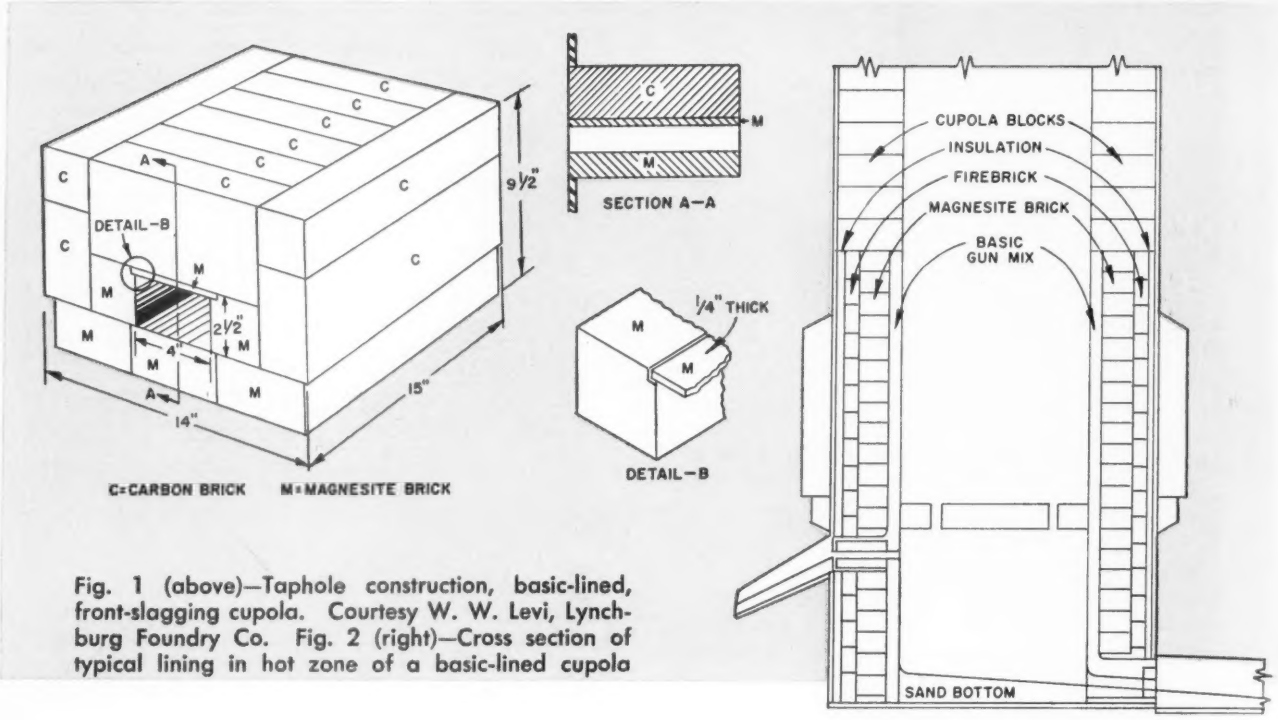


Fig. 1 (above)—Taphole construction, basic-lined, front-slagging cupola. Courtesy W. W. Levi, Lynchburg Foundry Co. Fig. 2 (right)—Cross section of typical lining in hot zone of a basic-lined cupola

Operating Practice with the Basic

Some foundries have turned to basic linings in cupolas as a means of obtaining better physical properties in castings. Cost is higher than that of acid lining, but there are various offsetting advantages

By CHARLES GREENLEE
Basic Refractories Inc., Cleveland

MANY FOUNDRIES have been faced with a demand for castings with better physical properties. To satisfy this demand, a number of cupola operators have investigated and are now operating cupolas with basic slags. New developments in alloy cast iron have required a superior base iron which can be produced more readily with basic cupola practice. Converting an acid cupola to a basic cupola enables the operator to develop basic slag systems with their advantages.

Advantages — Basic lining and repair materials are more costly than acid materials. Offsetting the higher cost are these advantages:

1. Lower sulphur content in the iron produced. Sulphur pickup by the iron is less, and in some instances there is a reduction of sulphur with a basic slag operation. When operating a cupola with a basic slag, the sulphur content of the iron will be approximately one-half that of the same cupola with an acid slag.

2. Greater carbon pickup. Due to the constant fluxing action of the basic slags on coke ash, the carbon of the coke is more readily available for absorption by the metal and for combustion.

3. Higher metal tap temperatures.

4. Use can be made of lower cost metal charges. Because of the refining nature of basic slags, lower cost materials can be charged without adversely affecting the quality of iron produced.

5. Absence of bridging and clean drop.

6. Better pouring characteristics of metal. Basic melted irons are more fluid than acid melted irons with the same carbon equivalent (due to higher ratio of carbon to silicon in basic irons).

7. Less scrap castings. Uniformity of metal decreases flaws in castings. This is particularly apparent in heat-treated castings where some flaws do not show until after the heat-treating process.

8. Steel scrap can be substituted for low-phosphorus pig iron without lowering the total carbon content of the iron produced.

Basic Cupola Slags—Cupola slags contain four major components which usually govern the reactions with the impurities in the metal and with

How To Calculate Degree of Slag Basicity

Cupola Charge:

Steel scrap	3800 pounds	
Pig iron	600 pounds	
Ferrosilicon	200 pounds	
Total metal		4600 pounds
Limestone	300 pounds	
Coke	800 pounds	

Silicon (Si) Charged:

Steel scrap	(.45% Si)	3800 × .0045 =	17.1 pounds
Pig iron	(1.00% Si)	600 × .0100 =	6.0 pounds
Ferrosilicon	(50% Si)	200 × .5000 =	100.0 pounds
Total silicon charge in metal			123.1 pounds

Silicon (Si) Tapped in Metal:

Metal (1.3% Si)..... 4600 × .0130 = 59.8 pounds

123.1—59.8=63.3 pounds silicon (Si) lost to slag. When silicon (Si) is oxidized to silica (SiO_2), 28 pounds of Si will produce 60 pounds SiO_2, therefore:

63.3 × (60÷28) = 135.6 pounds SiO_2 to slag.

Silica from Coke:

800 pounds coke (10% ash which is 50% acid oxides)

800 × .10 × .50 = 40 pounds acid oxides from coke.

135.6 + 40 = 175.6 pounds total SiO_2 or equivalent to slag.

(Note: If sprue is charged with sand coating, this SiO_2 should also be added to above.)

Limestone ($CaCO_3$) Charged:

100 pounds $CaCO_3$ = 56 pounds CaO when burned, therefore:

300 × (56 ÷ 100) = 168 pounds total CaO to slag.

Thus, the approximate CaO to SiO_2 ratio is:

168 ÷ 175.6 = .95

-Lined Cupola

the lining of the cupola stack. Two of the components are lime (CaO) and magnesia (MgO), which are classified as basic; the other two components, silica (SiO_2) and alumina (Al_2O_3), are classified as acid. To compare slags of different composition, a ratio is usually set up between the basic components and the acid components. This ratio is referred to as the basicity ratio of the slag. Although there is no set rule, one method of obtaining this basicity ratio using weight per cent is:

$$\text{Basicity Ratio} = (\%\ CaO + \%\ MgO) \div (\%\ SiO_2 + \%\ Al_2O_3)$$

As a general rule slags with a basicity ratio of .8 or below are classified as acid slags; those between .8 and 1.2 as neutral slags; and those over 1.2 as basic slags.

Slags with a basicity ratio of 1.2 or over have the ability to absorb sulphur from the metal and coke, and bring about the conditions that increase the tendency of iron to absorb carbon from coke. Both sulphur reduction and carbon pickup are favored by highly reducing conditions. Basic cupola slags showing any appreciable FeO content indicate a slight oxidizing condition and the desulphurizing properties of such slags are limited. Since carbon pickup and desulphurization are closely related in the basic cupola practice, carbon pickup is also limited for the same reason.

Under reducing conditions, basic slags with high basicity ratios have available lime (CaO) to react with the sulphur of the coke and iron to form a sulphide which is soluble in the slag, but not soluble in the iron. The ratio (S)/[S] of sulphur in the slag (S) and sulphur in the iron [S] is much higher with a basic slag system than with an acid slag system. The formation and solubility of this calcium sulphide in a basic slag increases with higher temperatures.

The dominant factor in the desulphurization of metal is slag basicity. Thus, the higher the basicity ratio of the slag, the better its desulphurizing properties up to the limit where the slag becomes too viscous and its workability poor. When this limit is reached, the desulphurizing properties are impaired due to mechanical reasons; so actually there are both high and low limits within which the slag basicity ratio must lie in order for it to function favorably. If the basicity ratio is too low, the desired metallurgy will not be obtained; if the basicity ratio is too high, the workability of the slag is poor. In some instances slags with very high basicity ratios are worked at cupola operating temperatures with the aid of fluxes such as fluorspar. For the most part, basic slags over wide composition ranges are just as fluid as acid slags, but the temperature range over which they remain fluid is not so great.

The following table indicates what sulphurs can be expected with various slag basicities. Obviously this table can only be an approximation, since operating temperature, height of slag blanket, slag viscosity, etc., all have their effects on the sulphur content of the metal produced.

Slag Basicity	Sulphur Content of Metal
0.8 or lower	.08% or higher
0.8 to 1.3	.08% to .04%
1.3 or higher	.04% or lower

As the charge gradually works its way down through the cupola stack and the coke comes into contact with the air blast, the carbon of the coke is burned, leaving the ash exposed. Since most of the coke is made up of acid components (silica and alumina), the basic slag present readily combines with the ash, exposing new surfaces of carbon. In this way carbon is always available for combustion and absorption by the metal. This is one explanation of the means by which basic slags contribute to higher operating temperatures, higher melting rates, and better carbon pickup.

When the silicon (Si) in the metal comes in contact with the air blast, some of it is oxidized to silica (SiO_2). Silica, as mentioned before, is an acid component and combines readily with the basic components of the slag. This may account for the higher silicon loss in the basic cupola as compared

to the acid cupola. Silicon loss in the basic cupola can be restrained, however, by keeping the operating temperatures high. High temperatures favor the retention of silicon in the metal.

Phosphorus when oxidized to P_2O_5 can be absorbed by basic slags, but in the cupola the large quantities of coke present keep the atmosphere reducing; hence the phosphorus cannot be oxidized to combine with the basic cupola slags. For this reason there is no appreciable difference in the amount of phosphorus charged and the amount tapped in the usual basic cupola operation.

Manganese oxide (MnO) found in basic slags will account for a slight loss of manganese. However, the loss is generally smaller for a basic operation than an acid operation.

Refractories—To convert an acid cupola operation to a basic operation, only the lining in the melt zone and well have to be replaced. The usual procedure is to place an insulating material next to the cupola shell. Next, a course of split fireclay brick are laid against the insulation and then one or two courses of either burned or chemically bonded magnesite brick complete the initial permanent lining. The magnesite brick should be laid in place with a good magnesite cement mix.

The height that the basic brick should extend above the tuyere level is determined by the height of the melt zone; this varies somewhat for each cupola. In most cupolas a basic lining that extends 60 in. above the tuyere level is sufficient. Insulation next to the shell is important in avoiding excessive heat loss since the thermal conductivity of magnesite brick is much greater than that of fireclay brick.

After the installation of the brickwork has been completed, a wood fire should be built in the cupola to completely remove the moisture. After the bottom is dropped from the wood fire, the brickwork should be covered with 2 or 3 in. of granular basic gun mix, which forms the working surface of the basic lining. It is emplaced by a refractory gun built for this purpose. The gun in combination with the granular mix makes possible a quick and easy method for repair and maintenance of the basic cupola lining.

Although it is not recommended, some basic cupolas are operated with just the basic gun mix lining emplaced over regular fireclay brick. This is not a safe practice since basic slags would readily erode the fireclay brick, causing a runout should the slag and fireclay brick come in contact with each other. In those instances where this practice has been successful, the daily operating periods are very short (1 or 2 hours) and the basic repair material is the only refractory that ever comes in contact with the basic slags.

Carbon ramming mixes also have been used to line the wells of some basic cupolas instead of basic brick and gun refractory. These mixes are rammed in place after preheating to approximately 175° F. They do not adhere well to other refractories, so proper installation requires that they be thick enough to support themselves. Basic slags will not react with carbon, and since the iron in the basic cupola is in constant contact with carbon in the coke, it also has very little effect on a carbon lining in the well.

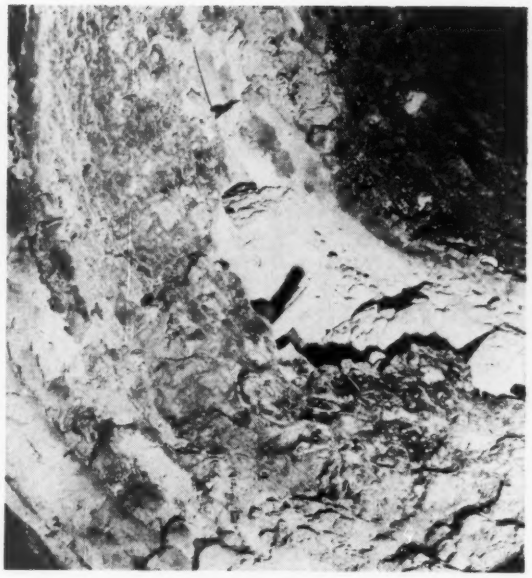


Fig. 3—View from cupola bottom shows inside cleaned before installing monolithic lining

Sand can be used to cover the bottom of a basic-lined cupola as in an acid-lined cupola. Usually sand is better for this application than basic materials. In some instances where the bottom was covered with a basic material, there was a tendency for this material to hang up when the bottom was dropped.

The slag hole of a rear slagging basic cupola is subjected to severe erosion, both chemically and mechanically. Various refractory materials have been tried for this application, but the two most successful have been carbon-bonded silicon carbide block or basic gun mix. The silicon carbide tap hole block is installed in the same manner as any slag hole block. A gun mix slag hole is installed by either shooting or ramming the refractory around a pipe or rod the diameter of the desired slag hole. This pipe or rod is then removed just before charging the cupola. If possible, it is better to use a rod with a slight taper to facilitate removal.

The metal tap hole of a rear-slagging basic-lined cupola causes very little trouble. It can be built from gun mix in the same way as the slag hole, or an acid refractory such as fireclay or a high-alumina block may be used. Building the slag hole and tap hole with the basic gun mix is the most convenient and time saving since they can both be installed while the lining is being repaired with the gun.

Fig. 4—Worker is using a refractory gun as he installs a basic mix lining inside cupola

Fig. 5—This view of the cupola illustrates the interior with monolithic lining in place

On a front-slagging basic-lined cupola, the tap hole is apt to be a source of trouble if the proper materials and care are not used when building it. One of the better tap holes for a front-slagging basic-lined cupola can be constructed using a combination of carbon and magnesite brick. Fig. 1 shows the arrangement of the brick for a tap hole of this kind.

Since carbon brick is resistant to basic cupola slags, and magnesite brick is highly resistant to metal, a combination of these brick forms a tap hole that will give many hours of satisfactory service. The ¼-in. magnesite sliver forming the initial top portion of the tap hole will protect the top of the tap hole from the molten metal at the beginning of the cupola run just prior to slagging. After the slagging operation starts, the magnesite sliver soon sloughs out, leaving the carbon brick in contact with the slag, and the metal in contact with the magnesite brick. By using this method of construction, no portion of the tap hole is ever subjected to severe erosion conditions.

For the front-slagging basic-lined cupolas whose operating periods are relatively short, more inexpensive materials can be used to build satisfactory tap holes. Here again a granular basic mix can be used to build the tap holes as well as the slag dam. This is usually accomplished by hand ramming around a form which is built to give the desired size tap hole and height of slag dam. If this practice is followed it is advisable to construct a permanent form that can be used each time the tap hole and slag dam are rebuilt.

Tap holes for front-slagging basic-lined cupolas operating short periods have been constructed from a clay plastic material containing graphite. Although the base material in this plastic refractory is acid, the graphite seems to resist the erosion of the basic slags, enabling the material to hold up quite well in the tap hole and dam application.

The basic gun mix of Basic Refractories Inc., known as Gundol, is a carefully controlled mixture of specially prepared dead burned dolomite and hydration resistant dead burned magnesite to which is added a small quantity of bonding chemicals. A mixture of this type contains, as its major constituents, magnesia (MgO), and lime (CaO), both of which are very resistant to high temperatures and basic slags. A general chemical analysis of the mix is: MgO 44.44 per cent, CaO 37.12 per cent, SiO_2 6.68 per cent, R_2O_3 9.54 per cent, loss on ignition 1.04 per cent.

Unlike acid refractories, a basic refractory containing dead burned dolomite is subject to hydration or slaking if proper precautions are not taken in use. The slaking action destroys the strength of the refractory mass and usually leads to complete disintegration. Hydration may result from poor storage facilities, prolonged exposure to the atmosphere, or most frequently from a long delay between the time that the refractory is installed in the cupola and the time the cupola is put in use.

Temperature plays an important role in the rate and degree of hydration. With refractories of the type mentioned, intermediate temperatures (200°—1100° F range) appear to be the most damaging. If, for example, it is necessary to allow the cupola to stand idle two or three days after gunning in a lining, the best practice is to let the cupola stand cold and (*Please turn to page* 184)

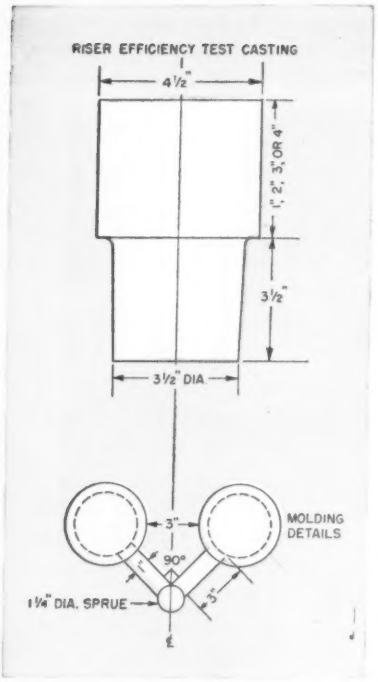


Fig. 1—Sketch of test casting and molding arrangement

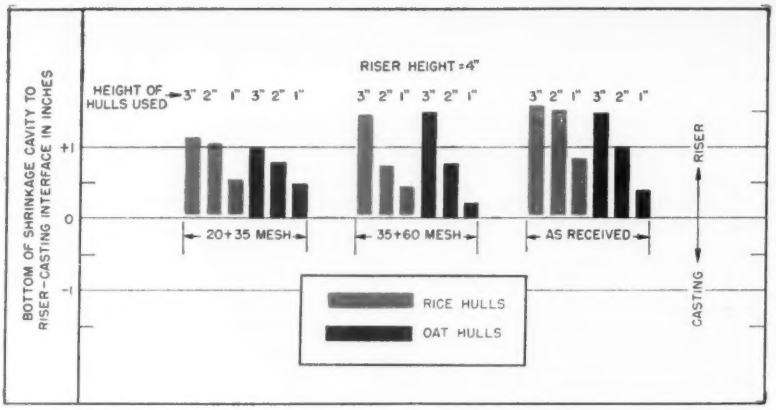


Fig. 2—Results of tests with risers 4 in. high indicate that all castings produced were sound

Use of Rice and Oat Hulls as RISER INSULATION

By S. L. GERTSMAN *Head* and R. K. BUHR *Metallurgist*

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ANTIPIPING compounds are used to prevent the formation of a skin of solid metal at the metal-air interface of a casting. As long as this skin does not form, atmospheric pressure will act on the molten metal and thereby aid the feeding of the casting.

Two general classifications of antipiping compounds are exothermic compounds and insulating compounds. Examples of this latter class are rice hulls and oat hulls. When these insulating antipiping compounds are placed on top of molten riser metal, they will burn. The resulting ash acts as an insulating blanket which tends to prevent the formation of the solid skin, and thus prolongs the feeding time. Consequently, the yield can be increased through the use of smaller risers.

Some antipiping compounds cause a change in the carbon content of the steel. A riser must be large enough to ensure that this change in composition occurs only in the riser and not in the casting itself. Riser efficiency is, therefore, dependent on both soundness and chemical homogeneity.

Experiments have been carried out with both rice hulls and oat hulls to determine:

1. The minimum riser height needed to produce a sound casting for three different hull heights and three different hull sizes.

2. Whether any carbon segregation is caused by these compounds.

Procedure—Mild steel from a 500-lb basic induction furnace was used for all tests. The final deoxidation of the steel was made with 2 lb of aluminum per ton.

The standard test casting employed was the same at that used in a previous Mines Branch investigation of antipiping compounds[1]. Fig. 1 is a sketch of this casting. The molding sand was New Jersey No. 70, and a silica wash was painted on all mold cavity surfaces. All the molds were baked before pouring.

Sixteen castings (eight molds) were poured from each heat. The molds were poured directly from the furnace at a temperature of 2948° F ±15° F (1620° C ±10° C). Temperature checks were made throughout the pour with a sheathed immersion type platinum-platinum-13 per cent rhodium thermocouple. The experiments were designed so that the height of riser metal plus the height of hulls equaled the mold riser height; for example, for a 4-in. riser tested with 2 in. of hulls, mold riser height equaled 6 in. Simultaneous additions of rice hulls to one riser and oat hulls to the other were made immediately after the metal flow ceased

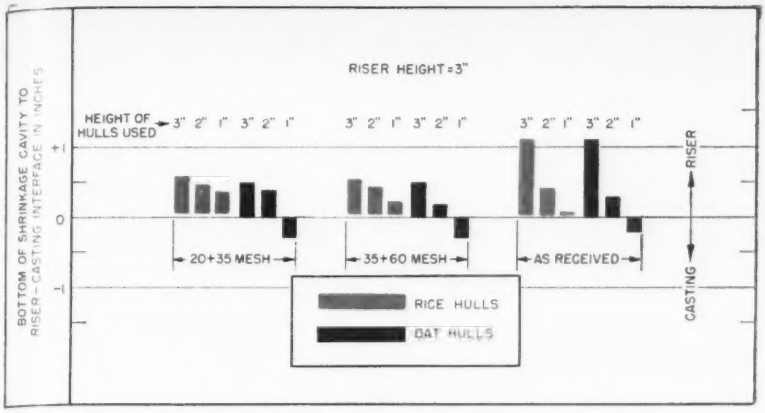


Fig. 3—Results of tests with risers 3 in. high show casting cavities with oat hulls 1 in. high

TABLE II—Analysis of Hulls as Received

Screen Size	Rice Hulls, % Retained	Oat Hulls, % Retained
16	82.3	0.35
20	8.5	0.82
30	2.1	3.17
40	1.3	11.90
50	1.2	23.50
70	1.4	21.90
100	1.3	14.70
140	0.9	7.40
200	0.6	4.66
270	0.4	3.70
Pan	0.0	7.90
Total	100.0	100.00

in each of the mold cavities.

The castings all were sand blasted and radiographed. The distance of the bottom of the shrinkage cavity to the riser-casting interface was measured to the nearest 1/10-in. from the radiograph negatives. This method was adopted since the deepest point of the cavity would not necessarily be revealed if the castings were cut in half.

The hulls were tested: 1) as received from the suppliers, 2) screened to $-20+35$ mesh, 3) screened to $-35+60$ mesh. Table I lists the weights of hulls necessary to cover the riser metal with 1, 2, and 3 in. of hulls for each of these three conditions.

Table II gives the screen analysis of the two types of hulls as received from the suppliers. It was necessary to grind the rice hulls before screening, but this was unnecessary with oats hulls since they can be obtained only in the ground condition.

Results — The shrinkage cavity measurements with respect to the riser-casting interface are shown graphically in Figs. 2, 3, 4 and 5. The zero line represents the riser-casting interface. All values that fall on the plus side of this line indicate that the shrinkage cavity did not extend beyond the riser-casting interface, i.e. the casting was sound. Negative values indicate shrinkage within the casting. Each graph depicts the results of varying the depth of hulls and the mesh size of the hulls for a constant riser height.

The minimum riser heights which will produce sound castings are given in Table III. It can be seen from this table that rice hulls are a slightly better antipiping compound than are oat hulls. The difference, however, is quite small.

Regardless of riser size, a 3-in. covering of hulls gave better results than when a lesser amount was used (see Figs. 2 to 5). The only exception to this was for oat hulls in the "as-received" condition on a 1-in. riser. Here the difference was

TABLE I—Weights of Hulls Used for Different Heights (Grams)

	Rice Hulls			Oat Hulls		
Mesh Size	3 in. High	2 in. High	1 in. High	3 in. High	2 in. High	1 in. High
As received	105	70	35	285	190	95
$-20+35$ mesh	284	189	95	256	171	85
$-35+60$ mesh	270	180	90	206	138	69

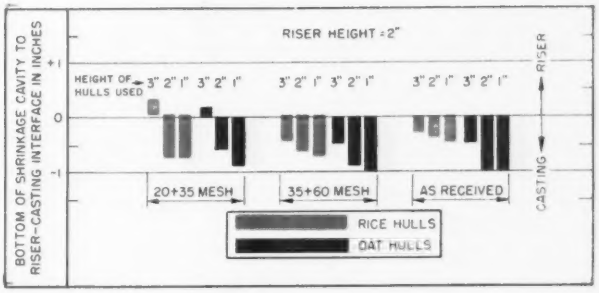


Fig. 4—When riser height was reduced to 2 in., all but two types of the hulls produced cavities

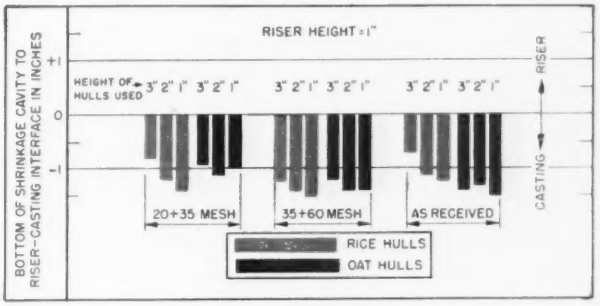


Fig. 5—Risers only 1 in. high produced cavities in all castings, regardless of type of hull

only 1/10-in. Also, only one case occurred where 2 in. of hulls was not better than 1 in. Again this was with oat hulls on a 1-in. riser but with a mesh size of $-20+35$.

Hulls in the "as-received" condition gave results equal to or better than screened hulls. This shows that there is no advantage in using ground and screened hulls.

A comparison between rice hulls and oat hulls in the "as-received" condition brings out an important point. Although little or no difference exists between the two as antipiping compounds, the weight of rice hulls used was less than 40 per cent of the weight of oat hulls. For instance, for a 3-in.-high covering of hulls, 105 grams of rice hulls were needed compared with 285 grams of oat hulls. The screen analysis in Table II explains the differences in weight required for the covering heights of hulls.

Figs. 6, 7, 8 and 9 are photographs which illustrate the main points brought out in this investiga-

tion. The castings shown were cut in half, surface ground, and deep etched in 1:1 HCl at 165° to 180° F for 15 minutes. This etchant reveals carbon segregation by preferentially attacking areas higher in carbon.

The two castings illustrated in Fig. 6 would be expected to exhibit the most severe carbon segregation if any were present, since the greatest amount of hulls was used on them—284 grams of −20+35 mesh rice hulls and 285 grams of "as-received" oat hulls. Also, carbon segregation in the casting itself would most likely occur with a 1-in. riser. The deep etch test has revealed no significant carbon segregation in these two castings or in any of the other castings that were etched.

Fig. 7 shows the effect of riser height on casting soundness. Three inches of "as-received" oat hulls was used on each casting.

Fig. 8 illustrates the effect of hull height on casting soundness. The riser height in each case was 3 in. "As-received" oat hulls were also used on these castings.

Fig. 9 shows the effect due to different mesh sizes of rice hulls. The riser height of each casting was 2 in., and a 3-in. covering of hulls was placed on each casting.

The smoking characteristics of both compounds were tested by adding approximately 6 in. of hulls, held in separate paper bags, to 10-in.-diam risers. No difference in smoking tendency between the two was noted; in fact, the gases emitted were ignited almost immediately (probably due to the paper bag containers) and gave off little or no smoke.

The prices of carload lots of the hulls in the "as-received" condition at the time of this study were $10 per ton for rice hulls and $27 per ton for oat hulls, both fob Montreal.

As pointed out previously in this paper, the weight of rice hulls required is only about 40 per cent of the weight of oat hulls to give comparable results. Therefore, rice hulls are a more economical riser insulator. Oat hulls would have to be less than half the cost of rice hulls, before they would be more economical.

TABLE III—Minimum Riser Height for Different Hull Heights Tested

Mesh Sizes	Rice Hulls — Minimum Riser Height for Hull Heights of: 3 in.	2 in.	1 in.	Oat Hulls — Minimum Riser Height for Hull Heights of: 3 in.	2 in.	1 in.
−20+35	2 in.	3 in.	3 in.	2 in.	3 in.	4 in.
−35+60	3 in.	3 in.	3 in.	3 in.	3 in.	4 in.
As Received	3 in.	3 in.	3 in.	3 in.	3 in.	4 in.

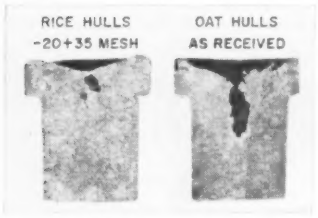


Fig. 6 — Deep etching failed to reveal any severe carbon segregation in these castings, although it was to be expected in them more than in any other of the etched castings

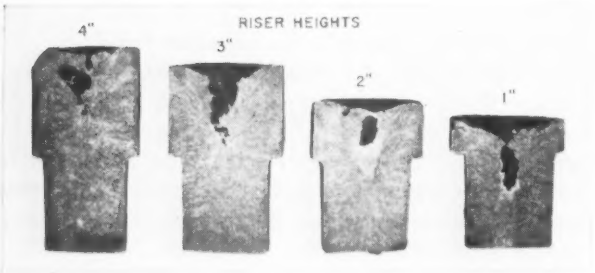


Fig. 7—Effect of riser height on soundness of castings; 3 in. of oat hulls was used on each

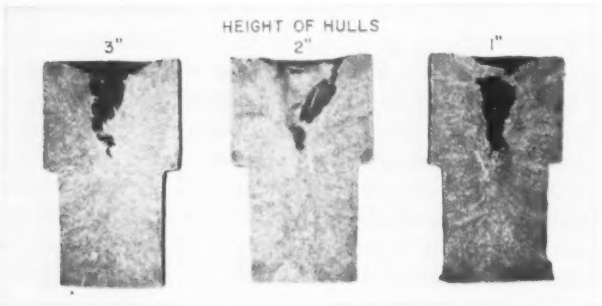


Fig. 8—Effect of hull height on casting soundness. Oat hulls were used, with 3-in. risers

Summary—

1. No advantage is to be gained by grinding and screening either rice or oat hulls.

2. In all cases except one, 3 in. of hulls gave better results than when lesser amounts were employed. This height of hulls is the minimum that should be used in production.

3. No carbon segregation was evident in any of the castings examined, as judged by deep etch tests.

4. No difference in smoking tendency between the two compounds was noted. Ignition of the gases appeared to eliminate smoke almost entirely.

5. Oat hulls will not be as economical to use as rice hulls, unless they are obtained for less than half the cost of rice hulls.

6. Rice or oat hulls certainly merit serious consideration as riser insulation compounds, due to their relatively low cost.

Reference

1. S. L. Gertsman, "A Study of Insulating and Mildly Exothermic Antipiping Compounds Used for Steel Castings," AFS *Transactions*, Vol. 57, 1949, pp. 332-342.

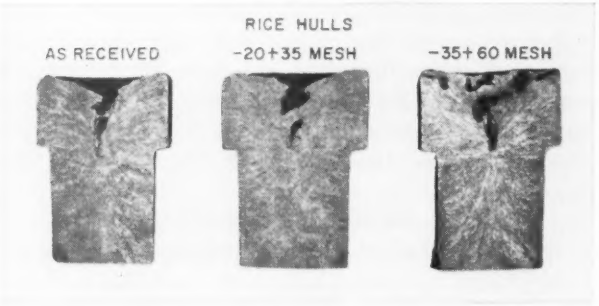


Fig. 9—Effect of mesh size of rice hulls; each casting had 2-in. riser and 3-in. hull covering

Related Information for Foundry Apprentices

How much related trade information, amplifying what the apprentice learns on the job, should be given him? Here is one successful program

By MAURICE SANDES
Field Representative
Department of Industrial Relations
Division of Apprenticeship Standards
State of California

A GREAT deal of interest has been shown recently in the type and amount of related trade information to be given to the foundry apprentice. For the most part the applicants to the molding and coremaking trade are short on educational background and the willingness to study and learn and so better themselves. This had not been helped by the oft-repeated remark of the "strong back and a weak brain." The question is therefore modified by the ability of the apprentice to absorb what is offered.

The content and an explanation of the related information as given in California, more specifically in the East Bay region which comprises the cities of Oakland, Berkeley, Richmond, Alameda, San Leandro, Hayward and other smaller communities, is the subject of this article.

Choice of Three Classes—The apprentices in this area are offered their choice of three separate classes all under different instructors who hold teachers' credentials from the state, but who work full time at the trade during the day. Two of the classes are held in Oakland at the Joseph C. Laney Trade and Technical Institute, a division of the Oakland Junior College. One class is held on Monday and Wednesday evenings, the other held in Berkeley in the Berkeley Evening High School. All are evening classes and last 2¼ hours. The classes are operated under the Smith-Hughes Act and are guided and advised by a joint apprenticeship committee composed of an equal number of representatives of labor and management. This committee approves the selection of instructors.

Both schools make available a study room and a small foundry. Most of the required 144 hours a year of school attendance is done in the study room mastering the required "Course in Molding and Coremaking" which is in three books listed as Parts I, II, and III. These were prepared by the Bureau of Trade and Industrial Education, California State Department of Education.

A great deal of credit must go to the co-ordinators of the two schools who had the confidence in the need for these classes and put them into being. For the most part they were responsible for convincing the instructional materials laboratory of the bureau that this course was necessary and important. More schools in foundry centers need to follow their example.

A Practical Course—In developing this course, every effort was made to keep the material practical so that the apprentices could put it to immediate use in their daily work. A state educational advisory committee consisting of employers and employees from the industry, assisted by expert consultants from the molding and coremaking trade, reviewed and approved this course and the text books used in it.

Parts I, II, and III of the course are popularly called "workbooks" and are divided into units and the units into topics (study assignments). Workbook I is designed to cover many facets of the trade, keeping most of it on an elementary basis. There are 7 units and a total of 62 topics in it.

Unit A is entitled "The Molding And Coremaking Apprentice And His Trade." It has five topics or study assignments. Unit B is entitled "Arithmetic For The Foundryman" and has 16 topics. Unit C is entitled "Hand And Machine Molding" and has 23 topics. Unit D is entitled "Coremaking" and has seven topics. Unit E is entitled "Metallurgy And Melting" and has six topics. Unit F is entitled "Casting Cleaning" and has two topics. Unit G covers " Workmen's Legal Rights And Benefits" and has three topics.

The units are not complete and comprehensive in their information, but continue on and complete themselves in Workbooks (*Please turn to page* 165)

Properties of Cast Iron at Elevated

This is a progress report on a study to determine the load-carrying ability of cast iron in the temperature range of 700 to 1000°F. The work is being carried on under the sponsorship of the Joint ASTM-ASME Committee on Effects of Temperature on Properties of Metals

AN EVALUATION of the properties of cast iron at elevated temperatures is being undertaken at Southern Research Institute, Birmingham, under the sponsorship of the Joint ASTM-ASME Committee on the Effects of Temperature on the Properties of Metals. The purpose of this work is to develop fundamental data on the characteristics of cast iron (conforming to ASTM Specification A278 Classes 40, 50 and 60) in the temperature range from 700 to 1000° F. The experimental results will be used to determine the load-carrying ability of cast iron for such elevated temperature applications as valves, dryer rolls, pumps, etc. Commercial cast irons furnished by reputable foundries in various parts of the country are used as test samples for this work.

Three general phases of experimental work are planned. The first phase of the work consists of a literature survey and screening tests on a large number of samples. This is intended to show the cast irons with the most promising high temperature properties for subsequent evaluation. Stress-rupture and creep tests will be run in the second phase of the work on the most promising materials from the first phase. The third phase will include thermal shock tests on the irons with good stress-rupture and creep properties.

The purpose of this report is to summarize the first phase of the current research program.

Literature Survey — Stress-rupture and creep tests provide the most useful data for the design of metal parts for elevated temperature service. These tests show the capacity of metals to carry loads without failure or excessive deformation at high temperatures. Other tests at elevated temperatures, however, such as growth and tensile tests, also give some indication of the expected service performance of cast iron at elevated temperatures. The following literature survey was intended to provide an over-all perception of the known elevated temperature properties of gray cast iron and to show their relationships.

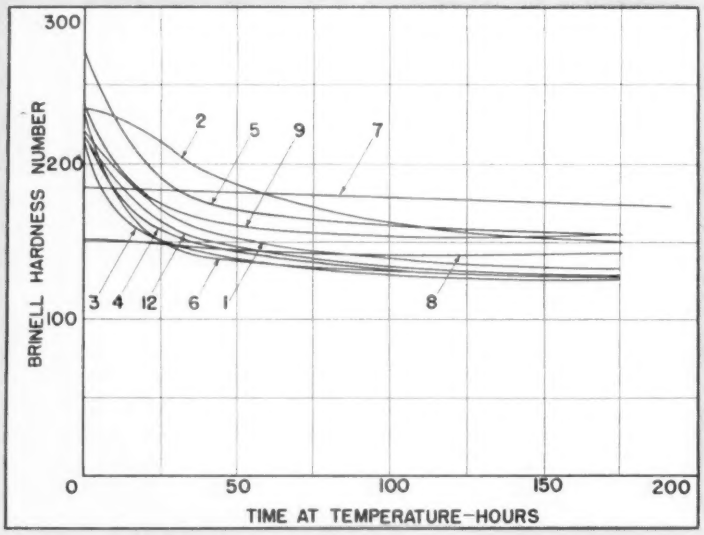


Fig. 1—Effect of 1100°F anneal on hardness of cast irons. Numbers refer to alloy numbers in Table I

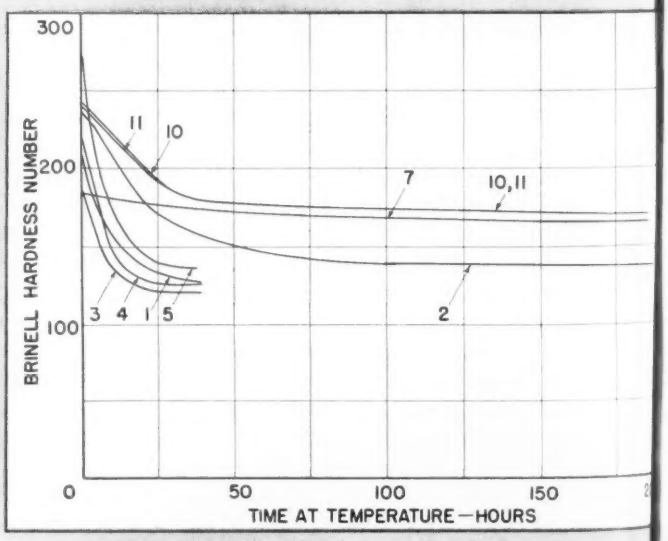


Fig. 2—Effect of 1200°F anneal on hardness of cast irons. Numbers refer to alloy numbers in Table I

ed Temperatures

By J. R. KATTUS
Senior Metallurgist
Southern Research Institute
Birmingham

TABLE I—Analyses of Test Irons

Alloy No.	C	Si	Mn	P	S	Cr[1]	Ni[1]	Mo[1]	Cu[1]	Mg[1]	V[1]
1	3.21	1.74	0.91	0.19	0.11	0.04	0.10	0.33	0.13	...	...
2	3.22	1.82	0.90	0.12	0.09	0.20	0.33	0.04	0.31	...	...
3	3.20	1.86	0.86	0.12	0.12	0.14	0.18	0.03	0.16	...	...
4	3.07	1.98	0.81	0.10	0.11	0.10	0.19	0.05	0.22	...	...
5	2.98	1.81	0.79	0.06	0.10	0.05	1.41	0.47	0.24	...	...
6	3.19	2.08	0.58	...	0.12	0.09	0.05	0.03	0.17	...	...
7	3.22	2.11	0.69	0.10	0.09	0.52	0.05	0.03	0.29	...	...
8	3.45	2.86	0.21	0.02	0.01	0.02	0.01	0.05	0.03	0.07	0.04
9	3.45	2.86	0.21	0.02	0.01	0.02	0.01	0.04	0.03	0.07	0.04
10	3.03	1.80	...	...	...	0.35	1.12	0.38	0.09	0.01	0.10
11	3.02	1.94	0.72	0.10	0.09	0.27	1.28	0.50	0.08	0.01	0.11
12	3.21	1.48	0.88	0.05	0.09	0.10	0.10	0.01	0.18	0.01	0.01

[1]Spectrographic analyses

TABLE II—Room Temperature Properties Reported by Manufacturers of Test Irons

Alloy No.	U.T.S., psi	Bhn	Y.S., psi	% El.	% R. A.
1	50,000	229			
2	49,900	228			
3	40,800	215			
4	49,800	231			
5	62,600	269			
6	36,300	217			
7[1]	48,100	217			
8[2]	61,200	149	44,600	17	12.2
9[2]	96,300	248	63,800	3	2.4
10	57,100	255			
11	54,200	248			
12	46,500	217			

[1] Alloy 7 was heat treated by manufacturer four hours at 1650° F and furnace cooled.
[2] Alloy 8 and 9 were from the same heat of nodular iron. No. 8 was heat treated by the manufacturer to the ferritic condition and No. 9 to the pearlitic condition.

TABLE III—Metallographic Examination, As Received Samples

Alloy No.	Matrix Structure	Graphite[1] Size	Graphite[1] Type
1	100% fine and medium pearlite	4-5	A
2	100% fine pearlite	4-7	A, D, E
3	100% fine and medium pearlite	4-5	A
4	100% fine and medium pearlite	4-5	A
5	50% fine pearlite and 50% Martensite	5-6	A
6	100% fine and medium pearlite	4-6	A, E
7[2]	25% ferrite and 75% medium and coarse pearlite	5-6	A
8[2]	100% ferrite	semi-spheroidal[3]	
9[2]	90% fine and medium pearlite and 10% ferrite	semi-spheroidal[3]	
10	100% fine pearlite	4-5	A
11	100% fine pearlite	4-5	A
12	100% fine and medium pearlite	4-5, 8	A, D, E

[1] ASTM Designation A247.
[2] All samples except 7, 8 and 9 in as-cast condition. Sample 7 annealed four hours at 1650° F and furnace cooled. Sample 8 heat treated to ferritic condition, and sample 9 heat treated to pearlitic condition.
[3] Appearance more like temper carbon in malleable iron than normal spheroidal carbon in nodular iron.

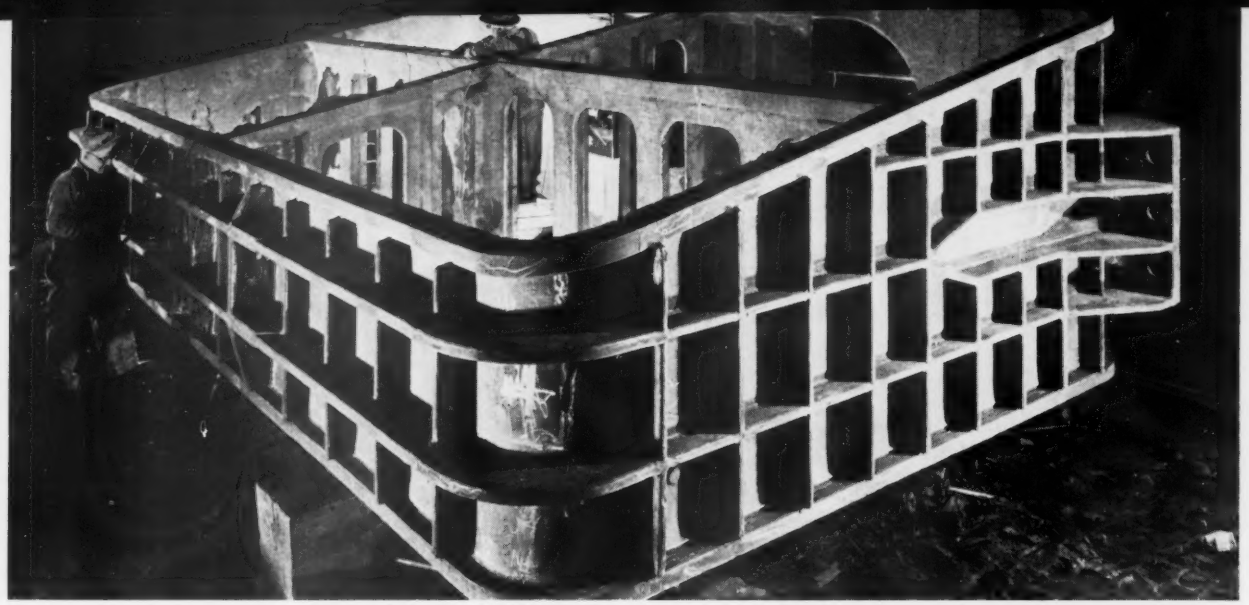
Previous investigations of the elevated temperature properties of cast iron have been limited. Much of the previous work has been confined to studies of growth and oxidation, which occur in cast iron at elevated temperatures and cause deterioration of properties. Elevated temperature tensile properties of some cast iron alloys have been determined, and the effect of prolonged heating on room temperature tensile properties also has been investigated for some cast irons. Studies of thermal shock and elevated temperature fatigue have been confined to only a few tests on a small number of alloys. The amount of published information on stress-rupture properties of cast iron is negligible. A few investigations of the creep resistance of cast iron have been conducted, but published results are insufficient for a full evaluation of the comparative merits of a broad range of cast iron alloys.

Knowledge of the growth characteristics of cast iron is important for the proper interpretation of creep data. Dimensional changes caused by growth must be subtracted from total elongation in creep tests in order to determine the amount of plastic strain produced by mechanical loading at elevated temperatures.

Growth of cast iron at elevated temperatures has been studied by many investigators. Kanter[22] showed that growth in air atmosphere starts at temperatures between 750 and 900° F, but in certain unfavorable atmospheres, such as superheated steam, some grades of cast iron probably grow at lower temperatures.[21] Many factors have been suggested as possible causes of growth. Graphitization and oxidation are believed by many[1,2,3] to be the principal causes. Another school of thought[4] contends that when iron is heated and cooled through the austenite-pearlite transformation temperature, differential expansion and contraction causes internal cracking. These cracks are believed to induce growth.

This theory, however, does not account for growth which occurs at constant temperature above or below the critical temperature. Grant,[5] in a recent study of growth, concluded that all three phenomena, graphitization, oxidation and differential expansion and contraction at the critical temperature, contribute to growth. This is in agreement with the previously published ideas of Bolton and Bornstein,[21] who suggested also that pressure from occluded gases and thermal gradients are possible additional causes of growth.

Growth of cast iron is associated with a deterioration of mechanical properties. Any factors which reduce growth will probably improve stress-rupture and creep properties of cast iron. Hallet[6] studied the effects of several alloying elements on growth in cast iron and found that a small addition of nickel and chromium retards growth somewhat. Large nickel additions (14-22 per cent) improved resistance to growth considerably. These nickel contents result, of course, (*Please turn to page* 230)



Workers clean the huge rectangular condenser water box casting to prepare it for machining and finishing. One-piece casting has two dividing walls

SIMPLIFIED DESIGN

Cuts Cost on Large Casting

SIMPLICITY of product design can often result in reduced pattern and foundry costs. This was demonstrated in the production at Allis-Chalmers Mfg. Co. recently of the largest one-piece castings it has ever made for four large rectangular condenser water boxes.

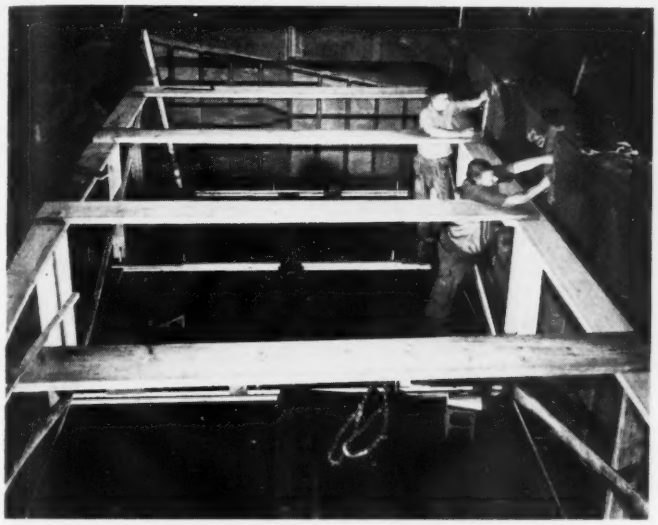
Design simplifications included incorporating the seat and cover cores into the outside body cores, thereby eliminating separate cores. And instead of including nozzles in the casting, flanged openings were used for pipe to be attached later.

Overall dimensions of the castings were 25 ft 9 in. by 15 ft, with height ranging from 6 ft 6 in. at one side to 4 ft at the other. Too large for the company's permanent pits, they were erected on the foundry floor.

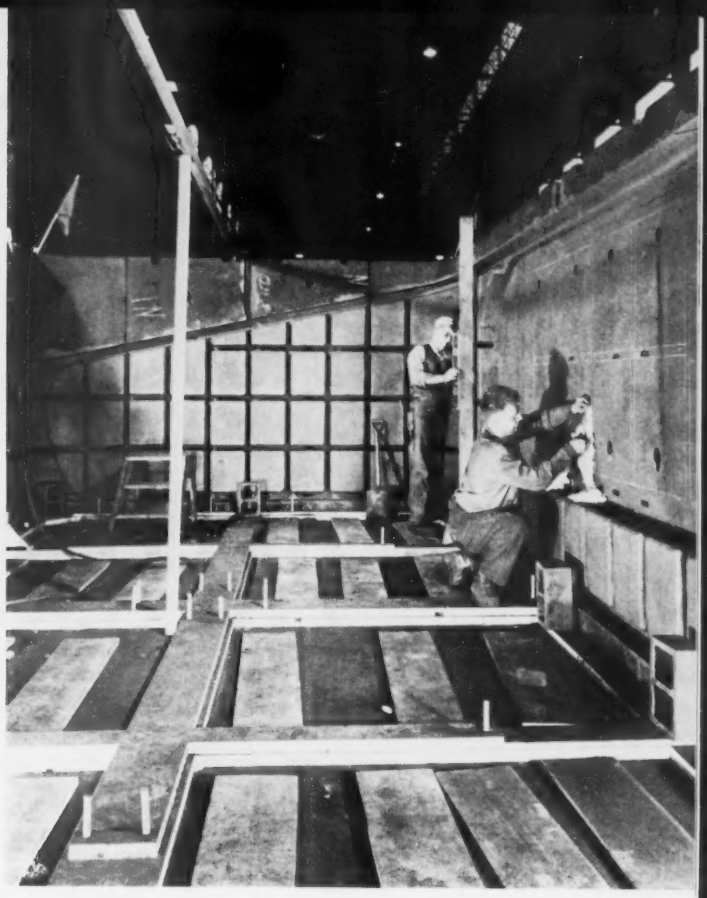
Fourteen individual coreboxes were required to produce 60 cores measuring 60 x 93 x 13 in. for each casting. The design permitted use of most of the corebox arrangements several times to produce identical cores for use at various points in the big assembled group of cores. Both flat and curved surface cores were used.

Core finisher is shown as he applies a protective coating to the packed sand as another step in the production of the one-piece water box casting

Above—Coremaker assembles box into which the sand is rammed as step in production of the water box casting



Above—Planks help maintain proper height and width as cores for large water box casting rise in foundry



Above—Molders follow outline of wooden template set on well rammed mold bed in putting up the outer wall. Template eliminated need for more complex core seats

Below—Four ladles paur molten iron into the mold for one of four of huge one-piece castings. Pour of the 37 tons of molten metal took 2 minutes and 45 seconds

Planning Influences PATTERN QUALITY

In a final accounting, few things are more important to the casting process than the quality of the patterns used. Here's how one modern pattern jobbing shop plans and works to insure the quality of its work

By ROBERT H. HERRMANN
Associate Editor

Wood layout man is in charge of production for one set of pattern equipment. Here he makes a full-sized duplicate of pattern blueprint on piece of yellow-painted pressed wood before production of the pattern starts

MOTOR PATTERNS CO., Cleveland, one of the largest pattern jobbing shops in the country, has been in business since 1919. Currently operating on a two-shift basis, the company employs 108 journeymen and apprentice patternmakers, plus, as General Manager Frank J. Oklessen puts it, supervisors, maintenance men and a truck driver. Of the total from president down, 25 are members of the company 20-year club.

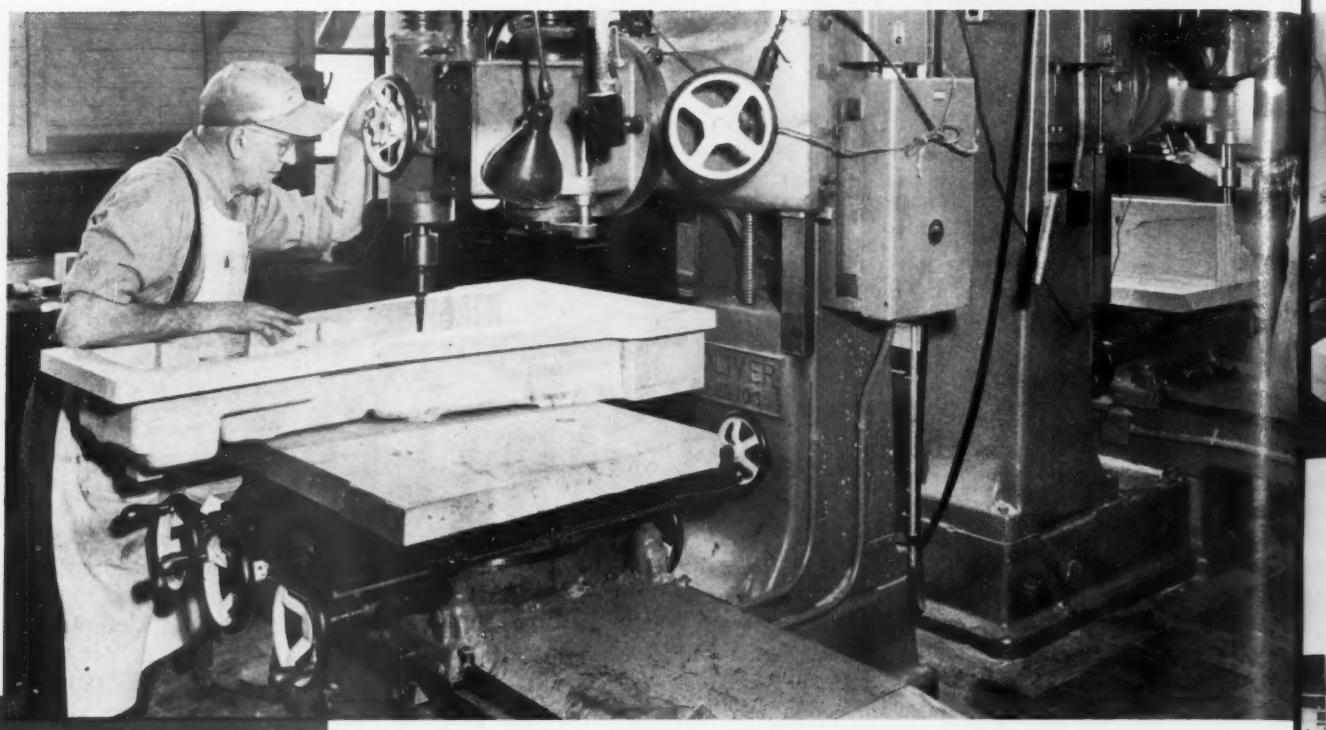
At present, about 14 apprentices are at work in the shop under a 5-year program conducted by the company in conjunction with the Ohio State Apprentice Committee. Each apprentice participating in the program, which will give him 10,000 hours of experience, attends Cleveland Trade School one day each week and draws from the company his regular hourly pay rate for that day.

The well-equipped shop and offices occupy about 44,000 sq ft of area and are well-lighted by huge windows and proper electric illumination. A meeting room in the office area is the birthplace of production methods to be followed in developing a pattern from blueprint to completion. It is here that the general manager, plant manager, superintendent, the wood shop foreman and the metal shop foreman meet to study drawings and to consider customer suggestions and needs in formulating production plans.

Before this meeting, at the time Motor Patterns is quoting on the job, company representatives have received from the buyer information on how the job will be molded—on the floor or on a molding machine, the type of machine, and other considerations pertinent to production of the casting.

ft—Left to right, planning new pattern production: William nchcliffe, wood shop foreman; Edward Pierie, plant manager; ank Oklessen, vice-president and general manager; Andrew Bar-, metal shop foreman; and Michael Dolan, plant superintendent

Below—Dust and chips are removed at woodworking machines by pipes connected to a central exhaust system. Pipes are open only when machines operate. Thus, maximum exhaust is obtained at each station



Planning Influences
PATTERN QUALITY

Cutting wood master pattern for diesel engine crankcase on milling machine. Work table can rotate freely, or its position can be set through gears with a hand crank which moves it in or out. Longitudinal movement is by power worm gear. Either power or hand wheel moves machining spindle vertically

Experience has shown that 90 per cent of pattern specifications originate in the foundry even though the buyer of castings may pay for the equipment. In those instances where the foundry buys patterns directly, the foundry which will make the casting is contacted if no other specifications have been given to determine how the part is to be cast.

Although Motor Patterns builds the master wood patterns and machines the metal production pattern, it does no foundry work, the masters being sent to a jobbing foundry for the necessary castings. When extra large or special patterns are involved, a representative of the foundry that will make the rough casting is called into the planning meeting for his suggestions on how the master should be made to facilitate casting of the rough metal unit.

Following this meeting the wood shop foreman explains the desired procedures to the wood layout man who will be in complete charge of the job. He is assigned an appropriate number of wood patternmakers to handle the work as the job progresses. He also makes a full-size duplicate of the pattern blueprint on a piece of pressed wood painted yellow. All dimensions are marked properly, including draft, shrinkage, finish allowance, pattern and corebox partings and core clearances. Shop patternmakers will refer to this board for dimensions as work progresses on the pattern. Pressed wood is used for the reference board because of its minimum shrinkage, expansion and warpage.

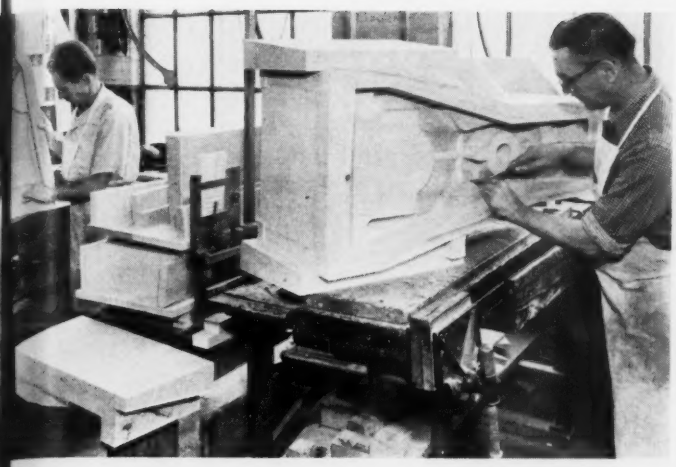
Production is carried on simultaneously on the pattern and related equipment: Coreboxes, driers, straighteners, and fixtures for core setting, core rubbing, core pasting and drilling pin locating holes in patterns, coreboxes or driers. When the wood master and corebox patterns are finished, they are inspected and checked, usually by the metal shop layout man. Then they are sent to the foundry for casting in any metal specified by the customer.

If the size or intricacy of the pattern warrants, the metal layout man will make properly dimensioned aluminum sheet metal templates of the pattern from which the metal finishing men will work. This is done while the metal pattern is being cast.

When the rough stress-relieved castings are returned to the pattern shop, the layout man paints various sections with "layout blue" on which he scribes lines from which the first machining cuts will be made. The casting will be returned to the layout man several times for checking and marking as the machine work progresses.

Sometimes, when several identical patterns are to be made, a wood model of the finished casting is produced for use as a master model on duplicating milling machines. In this case, of course, the necessary number of rough metal castings must be ordered from the foundry.

The rough machined pattern or patterns then go to the bench men who use both hand and power tools to clean off machining marks, smooth fillets and generally clean up each pattern and corebox. Finished pattern then is mounted on plates, and



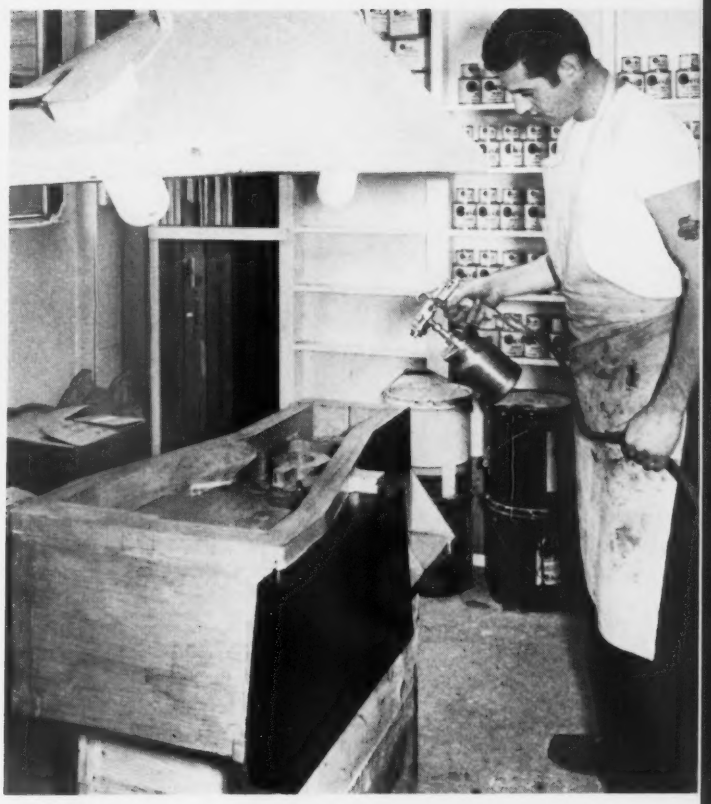
Hand finishing of wood patterns is done in area well lighted by natural illumination. Diesel engine slab coreboxes are being worked on here

Master cope pattern for diesel engine block is inspected. When okayed, it is sent to a foundry, where a production pattern casting is made. Note blueprint at rear for checking dimensions

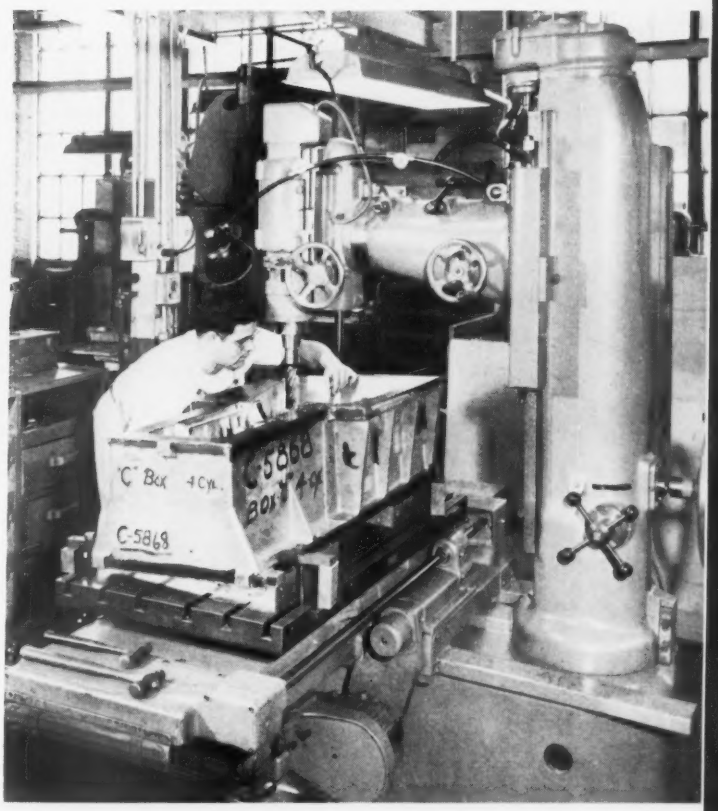
parting surfaces of coreboxes are faced with $\frac{1}{8}$-in. cold-rolled steel.

In the meantime, construction has been progressing on the wood master patterns for driers and the various fixtures ordered by the customer. When 200 or more driers are required, the master pattern is sent to a jobbing foundry and a matchplate made. One sample drier is produced from the matchplate.

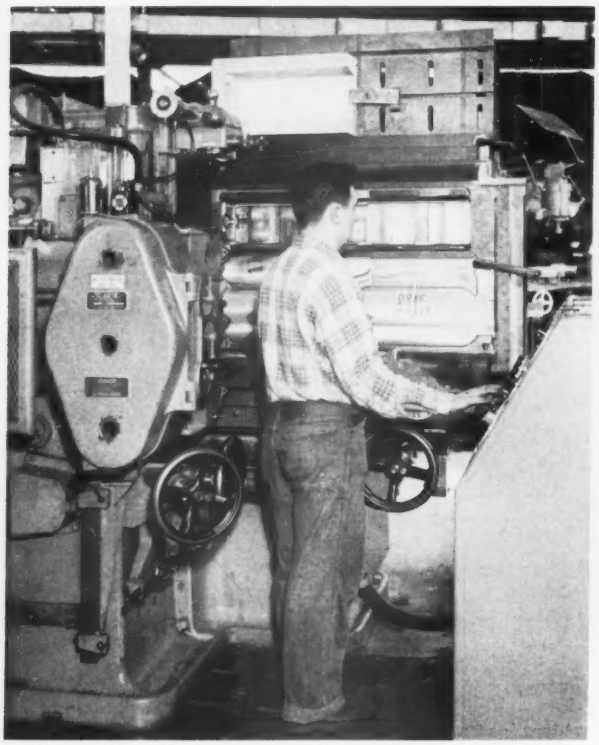
A drier fitting slug then is made from the finished corebox. This is done by machining a cast aluminum plate to fit the corebox face. Slotted openings in this plate permit pouring white metal into the box cavity. When the white metal solidi-



Finished wood patterns are spray-coated with a clear lacquer. Note the large exhaust hood and built-in fixtures for illumination of the work



Milling a diesel engine crankcase corebox. Operator is using hand mirror to observe cutting



Duplicating milling machine, using a plaster model, makes gray iron drag pattern sections

Making plaster model of tappet housing core for the plaster mold assembled for final inspection

Bench men clean up machined metal patterns and coreboxes with hand tools. Parting edges of most equipment are steel-faced to contour as in diesel engine crankcase corebox in foreground. Man at rear center is laying out rough drag pattern casting

fies, it retains the shape of the core on the aluminum plate.

Often a plastic slug is made. A wood frame is built around the corebox. Then the face and cavity of the box are coated with a parting compound. Next, epoxy resin is brushed on the face and cavity and allowed to gel, followed by another coating of resin. Strips of glass fiber cloth are laid on this fresh coating, then more resin and more cloth until the desired thickness has been built up. A metal reinforcing frame then is placed on the final resin coating of the built-up section. When the resin hardens, the frame is bonded securely in place.

Hand tools are used to finish either type of slug for use by the drier fitting department. The finished slug is coated with Prussian blue, and the single drier is placed over it and tapped gently with a mallet to assure a snug fit. When the drier is removed, the blue coloring picked up from the slug indicates high spots in the drier. High spots are worked off with hand tools until an even bearing surface is achieved. The matchplate pattern also is tooled or built up if necessary with cold-setting metal solder. Consequently, when the bulk of the driers are made, there is reasonable assurance that they will be of the required accuracy. Nevertheless, each drier ordered by the customer is fitted over the slug and any necessary tooling is done.

Castings for the various fixtures ordered by the customer are made from wood master patterns and tooled to the desired dimensions.

As a final check on the accuracy of the cope and drag pattern and the coreboxes, plaster molds and cores are made. If the customer does not furish flasks for this purpose, rough wooden flasks are made to the approximate size of the production flasks to be used. Drag and core components are assembled and easily accessible clearances measured with a rule. Contoured and hidden clearances are checked with ball bearings of proper size attached to wires. The wires permit the bearings to be lowered into and pulled out of the spaces between cores and drag. Thus minimum specified casting section thicknesses are checked.

Balls of modeling clay are placed in inaccessible recesses underneath or between cores to check clearances in the drag. Clay balls also are placed on top of the cores and the mold is closed. The clay is squeezed and the resulting thickness can be measured with a rule when the mold and cores are disassembled.

Gates and risers then are put on most of the high production patterns, and vents are inserted in the coreboxes. Slotted vents are used in curved sections of boxes because they can be machined to contour. Either slotted or screened vents are used in flat sections, according to customer specification.

In the shipping room, the master wood pattern, finished metal pattern, coreboxes, driers and drier plates, fixtures and the drier fitting slug are crated for shipment. All are part of the pattern equipment. If the customer has furnished flasks for the plasters, they also are shipped. Otherwise the plasters are held until satisfactory castings are being produced in the customer's foundry.

Process used in making drier fitting slug with liquid epoxy resin and glass fiber cloth strips. Exhaust hood draws off fumes from the plastic

Coated with Prussian blue, plastic slug shown in foreground is used to check driers. The man at left is trimming off high spots on a drier

QUESTIONS

Testing castings hydrostatically for leaks 106

Enameling difficulty . . . . . **Chill fails to work** 106

Bond bakes rapidly . . . . . **Cobalt-base alloy** 106

Hydrostatic Testing Methods

QUESTION If at all possible, could you send us information on hydrostatic testing of aluminum castings?

ANSWER Two methods are commonly used for testing hollow castings or other products to determine if they are leakproof or will withstand any given pressure. In both methods all openings except one are closed. In one method, water or other fluid under suitable pressure is forced into the interior through the only opening, and then the exterior is examined for evidences of leakage.

In the other method, air under pressure is forced into the casting while it is submerged in water. Presence of air bubbles arising through the water indicate leakage. Equipment for such testing is designed to accommodate the particular casting with the necessary clamping and sealing devices.

Has Difficulty in Enameling

QUESTION Enclosed are several examples of inclusions in cast iron which cause considerable pinholes and blisters in our dry process vitreous enameling operation. When this trouble arises it is particularly pronounced on tub castings; the greatest concentration is on the apron or apron side. Most recent epidemics from which the enclosed samples were taken occurred under the following production conditions: Cupola temperature 2750° F; pouring temperature 2600 to 2650° F; iron compositions TC 3.50 to 3.55 per cent, Si 2.40 per cent, Mn 0.30 to 0.35 per cent, P 0.60 to 0.70 per cent, and S 0.100 per cent max; also TC 3.55 to 3.60 per cent, Si 2.25 per cent, Mn 0.35 to 0.40 per cent, P 0.60 to 0.70 per cent, and S 0.100 per cent max. Generally, with an iron composition TC 3.45, Si 2.75 per cent, Mn 0.22 per cent, P 0.65 per cent and S 0.100 per cent max, the inclusion difficulty does not appear to be as severe.

We have been told by vitreous enamel people that the increase in Mn causes an increase in enameling difficulty and is probably the cause of these inclusions and resulting pinholes and blisters. Do you know if Mn is detrimental to good enameling practice? However, it appears to us that these inclusions contain sand which, of course, may or may not be just incidental. It would seem that the inclusions are not the direct result of iron composition, but rather result from foundry practice. We use natural sand with a permeability of 32, moisture 4.7 per cent and 5.8 psi green strength.

ANSWER Study of inclusions in the specimens indicates that they essentially are slag, although one definitely showed the presence of small transparent particles which appeared to be silica. Hole left

Reproduction is twice actual size

by the latter material had a dull blue oxidized appearance, indicating the presence of moisture originating possibly from a very small "clay or sand ball" which was dislodged and carried into the metal. This material also left a relatively clean hole when removed, while in the case of the others referred to as containing slag, grayish incrustations were left on the walls. These observations are based on examination with a low-power magnifying glass, and study of the inclusions under much higher magnification would be required for more positive identification.

These slag particles or inclusions, while seemingly located in the central portions of the 3/16 to 1/4-in. sections, do reach to the skin or just under it, and in the latter case in such a manner that they are not visible under the usual inspection procedure. In either case the enameling operation opens them to permit the contained air or gas to form blisters in the enamel coating or allows the molten enamel to partially enter the cavity and form a pinhole. Possibly a more intensive abrasive blasting by reducing the rate of travel through the blasting room or chamber might open up the defective areas sufficiently to make them visible.

While we attribute the difficulty to slag inclusions, we cannot state definitely how they can be eliminated. Slag might arise from allowing it to get into the spout of the teapot type ladle, from sloughing off of the refractory in the spout, failing to knock off the drips on the ladle lip, or failure of the wet refractory patches applied for lip repair during operation. Possibly it might arise from cupola operation or from some of the raw materials used. It might be pointed out in the latter connection that a British investigation by Evans and Webster indicated that substantial additions of enameled scrap to the cupola charge caused cracking due to pickup of boron, antimony and lead, and that such additions should not be over 5 per cent and preferably none at all.

We found only one reference in the literature stating that manganese is deleterious to enameling. Harrison and Krynitsky in *Transactions*, AFS, 1930, mentioned that use of high-manganese pig iron caused trouble in enameling without any indication of what was considered high. In tests conducted on two types of irons, one blistering and the other non-blistering had manganese contents from 0.24 to 0.60 per cent in both, but no differences were attributed to the variation in manganese. Possibly the reference to high manganese content forming inclusions is based on investigations by F. J. Cook in 1931 and R. Jolly

in 1954. Both found that a type of manganese sulphide inclusion formed when the manganese/silicon ratio approached unity, and indicated that the Mn content should be not less than 0.4 per cent below the Si content to avoid the trouble. However, the formation of such inclusions seemed to be confined to heavy castings.

Jolly states that increasing the Si content seems to eliminate the occurrence of such inclusions—presumably holding the Mn constant. You might dig out a sufficient quantity of the inclusions to make chemical analysis and determine the composition.

Copper Chills Do Not Operate

QUESTION We have a problem in our brass foundry with chills in that they seem to lose their effectiveness after a period of one or two months. We are pouring silicon bronze and the chill is copper, 3 x 3 x ½-in. Casting is a marker or tablet containing an emblem with an over-all thickness of ⅜-in. plus another ¼-in. background thickness that the emblem sets on. Main problem is shrinkage in the emblem area when the chill goes bad. Chill is prepared by sandblasting, heating to drive off moisture, and shellacking the edges.

ANSWER Your difficulty with chills losing their effectiveness is due to some other cause or causes than the chills themselves, and the problem is to determine why they do not function. We note that you mention you heat the chills to drive off the moisture, and there is a possibility that the chills are too hot when placed in the mold. Chilling power is determined by the heat capacity of the chill, and when hot the capacity is less than when the chill is cold. Usually all that is necessary temperature-wise is that the chill be as warm as or perhaps slightly warmer than the molding sand to prevent condensation of moisture between closing and pouring the mold.

However, we suspect that the difficulty arises in the relationship of chill to casting or, more specifically, location of chill to the gate or metal entry. If the chill is near the gate, it cools the metal going into the mold; if the metal is on cold side, it freezes off before the heavier or emblem portion is properly fed. Conversely, when the metal is hot, the cooling effect is not great enough to prevent feeding to the point that external shrinkage indications are visible. Even so, we believe that fracture of the heavy section would show shrinkage in the center. Since we do not have any information on size of the casting, gating, etc., we can only make guesses. Possibly a change in gating, size of the chill, and control of metal temperature might be in order.

Again without exact knowledge of the casting, it occurs to us that by hollowing out the back of the emblem section of the pattern to obtain a uniform metal thickness throughout, you could eliminate the use of chills, and simplify the molding problem considerably. In fact, that could be accomplished without any work on the pattern by using a board on which the necessary projections to perform the "thinning out" are located, to make the other half mold.

Core Sand Bond Bakes Rapidly

QUESTION We have heard that there is a plastic binder for sand cores which can be baked in about 30 seconds and gives satisfactory results. Do you know where we can obtain such a binder which can be used in coreblowing machines?

ANSWER Practically all of the resin manufacturers produce bonding materials which can be used in coreblowing equipment and bake fairly rapidly in the conventional core oven. When the cores are baked in dielectric units, wherein the heat is generated within the core itself, the time is reduced to a matter of minutes—depending upon the size and weight of the core.

While we have not heard of a resin baking as rapidly as you indicate when used in conventional cores—that is, those which are solid—we do know that hollow, shell-type cores or those with thin sections can be baked in almost that length of time. However, such production requires use of hot coreboxes and the process is similar to making shell molds. For example, at least two manufacturers are making coreblowing machines which are said to operate on a cycle of less than one minute.

Handling a Cobalt-base Alloy

QUESTION Please give us the following information on casting Stellite: 1—Can it be melted satisfactorily in a graphite crucible? 2—If a flux is needed, what kind? 3—Our propane-fired crucible furnace reaches a temperature of 2600° F. Is that adequate for Stellite?

ANSWER While we do not have any definite information on your problem, it might be pointed out that "Stellite" covers a number of alloys which vary in composition and are used for different purposes. Possibly the one you refer to is No. 21 which is somewhat similar to Vitallium. It contains 27 per cent Cr, 6 per cent Mo, 2 per cent Ni, 0.25 to 0.30 per cent C and remainder Co. It is used in high-temperature applications.

Melting point of the alloy is given as 2547°F, but can be reduced 50 to 100° by increase in carbon content. It would be our opinion that the 2600°F temperature reached by your furnace would not provide sufficient superheat to promote fluidity, although it might if the alloy were poured into a mold heated to around 2000° as in the investment molding process.

We doubt that a graphite crucible could be used due to pickup of carbon, but if that would not make any difference, it might be used. It is our impression that the other version of the No. 21 alloy used for dental applications is higher in carbon. So far as we

know for making castings, at least by the investment molding process, the cobalt-base alloy is melted in small indirect-arc electric furnaces. Possibly the producer of the cobalt-base alloys can supply details on melting procedure.

Gating for Manganese Bronze

QUESTION We are sending you a manganese bronze casting made to Navy specification 49 B 3f and two radiographs showing some internal flaws which caused rejection by the customer. We mold two patterns in a 12 x 18-in. flask with 3-in. drag and 4-in. cope, using Albany No. 1 sand. As shown on our rough sketch, we use a strainer core in the sprue, which leads into a runner about ½-in. wide. From the runner three gates ½ x ¼-in. about 1 in. apart lead to each of the castings. Three 2-in.-diam risers equally spaced are attached to the periphery of each casting. Castings are poured at 1900 to 1950° F.

ANSWER As you undoubtedly know, the aluminum content of manganese bronze necessitates gating methods whereby the alloy enters the casting cavity with the least amount of turbulence. If the metal stream is broken, the aluminum oxide skin or envelope is disrupted to form inclusions which become entangled in the stream and eventually lodge somewhere in the casting. Examination of the radiographs indicates the presence of such inclusions. This should be checked by actual sectioning of the casting at the particular areas. Unfortunately, we are not equipped to do that. We feel reasonably certain that the defects are not shrinkage since your present gating method appears adequate to eliminate trouble on that score.

However, we believe your gating method causes turbulence and should be changed. Two procedures are suggested in the accompanying sketches. One uses your present arrangement of two patterns, which we assume are mounted on a board in the positions shown. A single riser placed as close as possible to the two castings is employed. Details are indicated on the sketch. Metal entry from the sprue is through a short runner attached to the riser near the bottom. This arrangement, we believe, will meet the usually advocated "bottom gating" for manganese bronze.

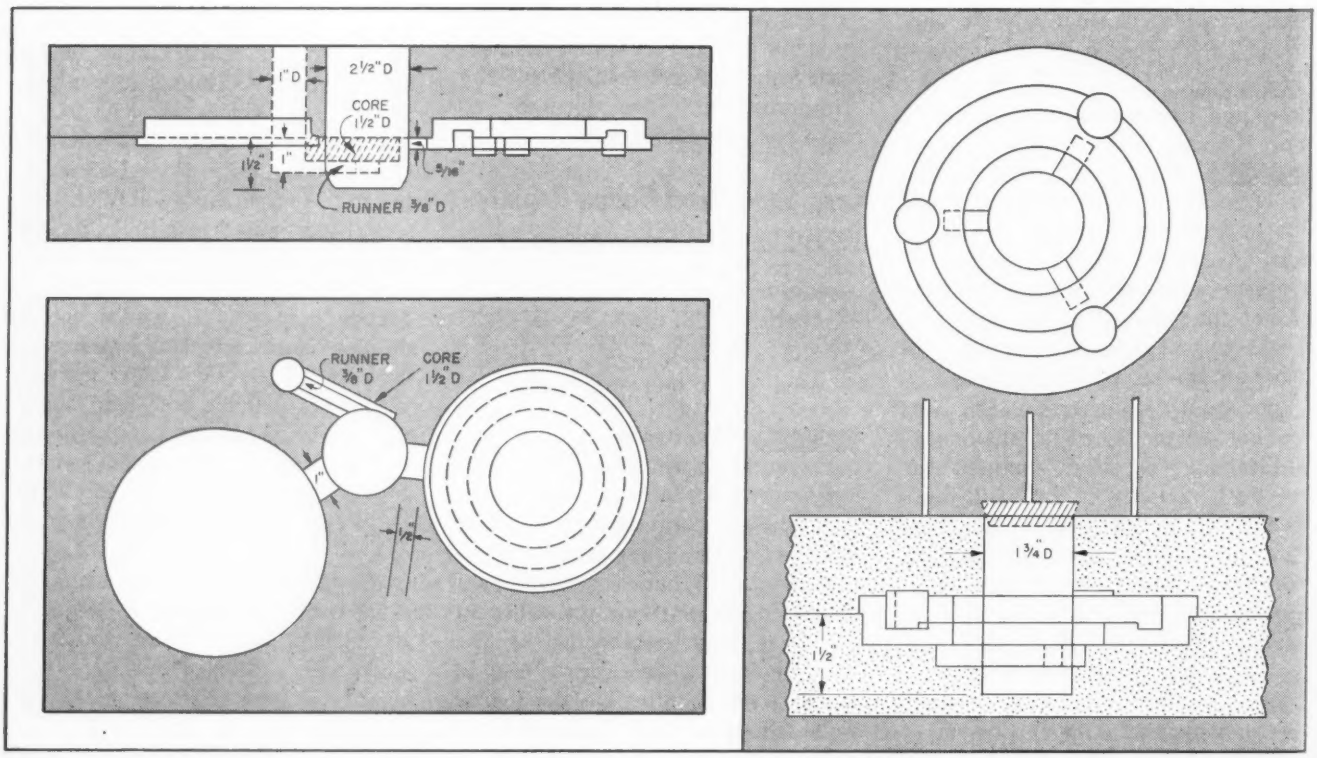
The other sketch is for a single pattern which is turned over so that the flat side is in the drag. The combination riser - sprue is located in the center with three equally spaced gates leading to the underside of the casting. Possibly the gates could be attached directly instead of below. As a precautionary measure with this type of riser-sprue, it may be advisable to use a small basin over the top with a plug in the opening. The basin can be designed to hold just enough metal to fill the casting cavity and riser. When the basin is filled with molten metal, the plug is lifted out, permitting only clean metal to drop into the riser.

Experimental work should be conducted to determine the best riser size, since any reduction will provide a better yield.

Manganese Steel Life Short

QUESTION In our steel foundry in Portugal we regularly produce 12-14 per cent manganese steel castings and are worried because the final samples that come from the furnace at the moment of tapping (furnace or ladle) always give higher carbon than that of the castings from the same melt. Samples from the castings or sprues are before quenching. We generally use the Leitz carbonmeter for samples at the furnace. We changed over to a bigger sample (small ingot 1½ x 1½-in. at top and 4 in. long) but get the same results as with the carbonmeter type. For instance, the final test

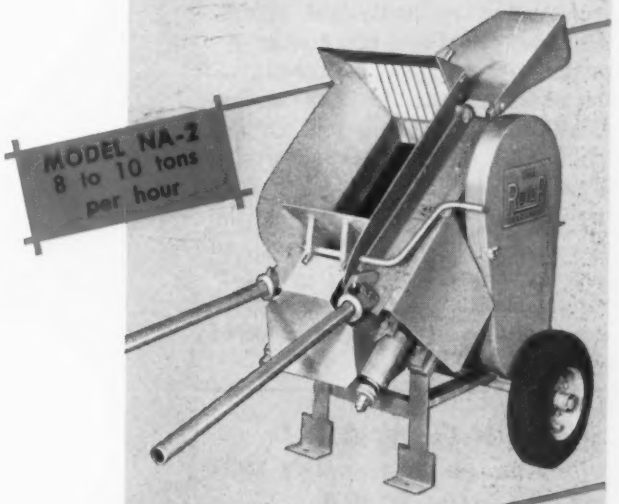
(*Concluded on page* 110)



Two suggested gating procedures to obtain sound manganese bronze castings.

PROPERLY PREPARED SAND

for Small Foundries Core Rooms Side Floors



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Foremost in Sand ROYER *Conditioning Equipment*

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(*Concluded from page* 108)

gives 1.2 per cent C while in a casting or sprue 1½ to 2 in. thick we get 1.15-1.16 per cent C. We find this difference in hundreds of tests and would like to know which is correct. We are worried because some clients are not satisfied with the life of the castings, for they are too soft. We have checked the quenching and the structures are fully austenitic.

ANSWER You evidently are speaking about the limit of accuracy in commercial carbon determinations, and that can only be established by careful, painstaking work on a number of "standard" samples by different analysts. However, if you are sure that the difference in carbon determinations is not due to analytical errors, then the variations are due to decarburization during exposure of the molten metal to the atmosphere during pouring and to the mold gases as the casting cavity is being filled. A decrease of 0.01 per cent in carbon content can be expected between furnace test and average of the castings in low carbon steels. The higher carbon of manganese steel would be expected to show a larger decrease of the order you mention.

However, it is certain that the decrease in carbon mentioned is not causing the trouble of excessive wear in service, and we suspect it is due to misapplication of the steel. If manganese steel is employed where the surface is not work-hardened by peening or other impact, such as in sand or soft clay, it may wear faster than normalized steel at 250 brinell. For that reason a quenched low-alloy steel hardened to 400-450 brinell is used in this country for applications involving abrasive wear without the work-hardening feature.

Mold for Making Master Gates

QUESTION We have been using quite a few plaster-cast matchplates in our malleable foundry and believe that on many items an old-fashioned sand-cast matchplate would be better. The reason the old-fashioned plate has been abandoned is because of the high cost of producing master gates for small items. We are very much interested in being able to make a permanent mold in which we could cast three or four small white metal patterns; low-temperature melting metal if necessary. We would like this permanent mold to be small—say 4 or 6 in. square, and to be of such metal which would stand pouring 20 or 30 casts of the white metal. Could you tell us where this type of metal could be obtained or where such molds could be made for us—we to supply the master pattern.

ANSWER While there is a growing trend toward use of "pressure-cast" matchplates made in plaster molds, we doubt that the sand casting method ever will be abandoned. One important advantage of the plaster method is that only one master pattern is required to produce a multiple pattern plate. As to your own problem, a variety of materials might be used for forming the master gates in white metal. The molds could be made of cast iron, brass or bronze, aluminum, plaster, or in the case of a low-melting point alloy, the mold could be made of wood or rubber. For example, an alloy of 55½ bismuth and 44½ lead which can be poured in the range 270 to 310° F will not discolor or char wood. It has no shrinkage when gated properly.

It appears to us that you could make your own molds by adding sufficient ferrosilicon to a ladle of your present white iron to produce a gray structure. Possibly you have a crucible furnace for making brass, bronze or aluminum castings for patterns, repair or maintenance, and could make the molds from one of those alloys. Although plaster could be used, it is relatively fragile. On the other hand, any gray iron or nonferrous foundry could make the molds from your patterns. It undoubtedly would be advisable to inform the foundry on the application of the mold so that steps could be taken to provide a good surface on the cavity to eliminate as much finishing as possible.

Although you mention making the master gates in white metal, we suggest that you consider making them in a castable resin such as employed for production of what commonly are called "plastic" patterns. They are produced in plaster molds, and probably with a little care in handling the molds, they could be used to make a number of "casts."

"Steady boy—steady!"

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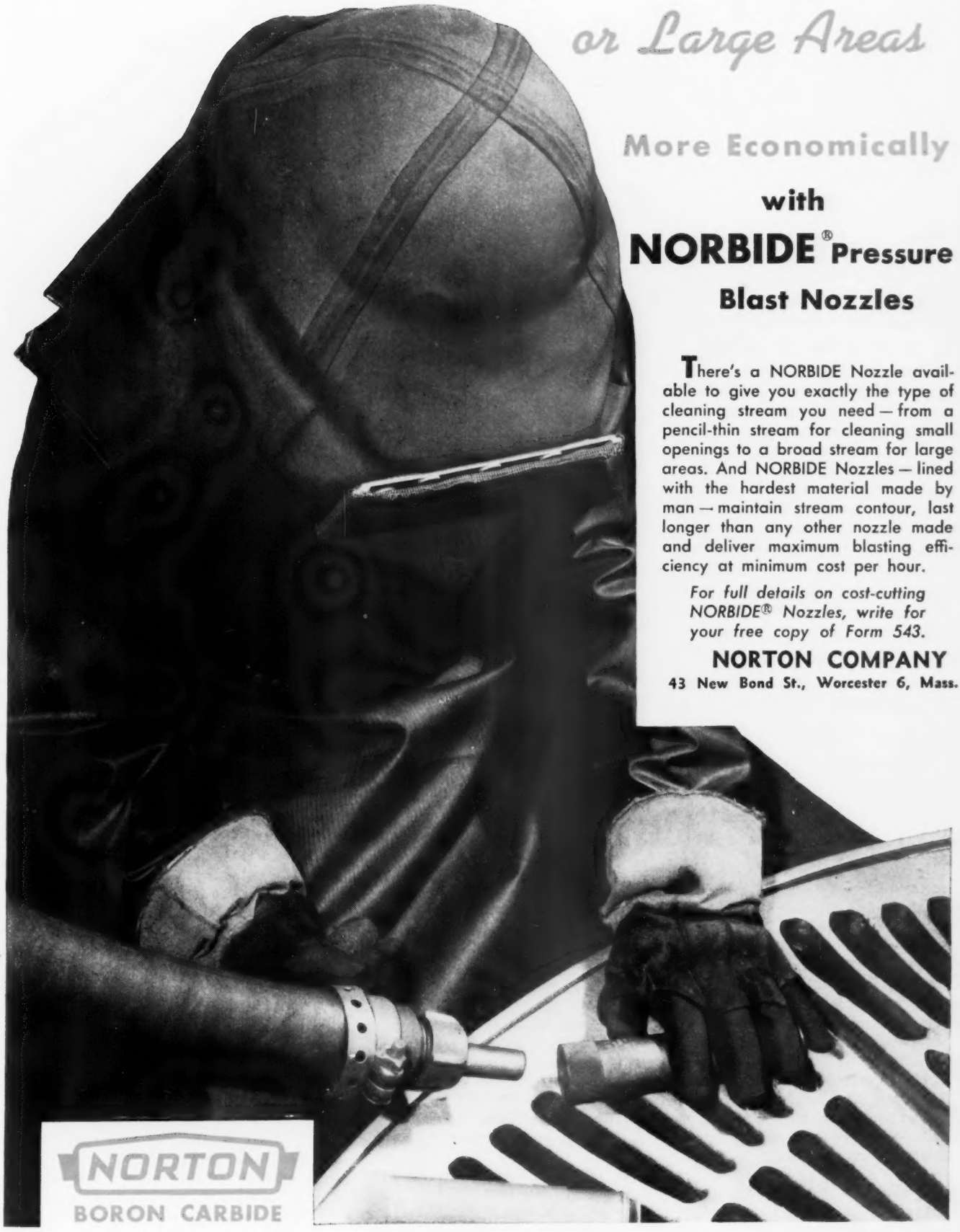

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MEN OF INDUSTRY

JAMES H. LOWE
. . . joins Keokuk Steel

W. G. TWYMAN
. . . becomes Canadian mgr.

JAMES J. OFFUTT
. . . Green Fire Brick mgr.

WILLIAM S. PELLINI
. . . receives Science Award

JAMES H. LOWE has been appointed director of product development, Keokuk Steel Casting Co., Keokuk, Iowa, and its affiliate, Mid-Continent Steel Casting Corp., with headquarters at the offices of the latter company in Shreveport, La. Mr. Lowe was graduated from University of Wisconsin, and from 1941 to 1945 was associated with E. I. du Pont de Nemours, Wilmington, Del., as chemical engineer and quality supervisor, military explosives division. In 1946 he joined Wehr Steel Co., Milwaukee, as technical and research director. Since 1952 he was assistant technical and research director and product development director, Steel Founders' Society of America, Cleveland, as well as a member of the Government Advisory Committee for Cast Armor.

♦ ♦ ♦

Douglas P. Ferguson, formerly chief metallurgist, Wilson Foundry Division, Willys Motors Inc., Pontiac, Mich., has joined the abrasive engineering department, Bonded Products and Grain Division, the Carborundum Co., Niagara Falls, N. Y., where he will specialize in metal additives engineering services. Mr. Ferguson was graduated from Rensselaer Polytechnic Institute and did advanced study in metallurgy at University of Michigan. Previously he was associated with Neenah Foundry Co., Neenah, Wis., and Ford Motor Co.'s Specialty Foundry, Dearborn, Mich.

♦ ♦ ♦

Hjalmar Nilsson, since 1947 plant manager, has been appointed chief engineer, Magnesium Co. of America, East Chicago, Ind. **Eugene Gallmard** has been named administrative asistant to Mr. Nilsson.

James J. Offutt has been named manager of domestic and Canadian affiliate companies, A. P. Green Fire Brick Co., Mexico, Mo. **W. G. Twyman** has succeeded Mr. Offutt as general manager, A. P. Green Fire Brick Ltd., Toronto, Ont. Messrs. Offutt and Twyman are graduates of Missouri School of Mines. Prior to transfer to the Canadian company in 1946, Mr. Offutt was superintendent of the company's tunnel kiln plant in Mexico, Mo. Mr. Twyman formerly managed A. P. Green Fire Brick Co. of Michigan, Detroit.

♦ ♦ ♦

Hamilton M. Ross, formerly manager of the Passaic, N. J., and Philadelphia plants, Hewitt-Robins Inc., Stamford, Conn., has been named manager of operations, Conveyors Division. He joined the company in 1941. **Harold E. Murken,** who was product sales manager in Passaic, has been named manager of conveyor system sales in New York, where he will co-ordinate activities of the general sales organization and engineering department. He has been with the company since 1927.

♦ ♦ ♦

Frank V. Jasienski has been appointed general superintendent, Albion Malleable Iron Co., Albion, Mich. **Michael Masternak** has succeeded Mr. Jasienski as foundry superintendent. **Donald Huizenga** has been made foundry general foreman.

♦ ♦ ♦

David F. Christnelly has been appointed assistant sales manager, Stearns Magnetic Inc., Milwaukee. He joined the company in 1951 and was formerly in the sales department and a production expediter in the transmission plant.

William S. Pellini, superintendent, Metallurgy Division, Naval Research Laboratory, Washington, has been selected by the Washington Academy of Sciences to receive its 1954 Award for Scientific Achievement in the Engineering Sciences. The award, granted "in recognition of Mr. Pellini's notable contributions in the field of metal processing," is based on his work in casting and welding metallurgy prior to his recent promotion to superintendent of the Metallurgy Division at the Naval Research Laboratory. Presentation of the award plaque was made at the annual meeting of the academy, Jan. 20.

♦ ♦ ♦

F. B. Barclay, for 3 years assistant works manager, Commonwealth Plant, General Steel Castings Corp., Granite City, Ill., has been named works manager, succeeding **G. L. McMillin,** who has become assistant vice president, Canadian Car & Foundry Co., Montreal, Que., Canadian associate of General Steel Castings. Mr. Barclay attended University of the South, and joined the company in 1930. His experience includes 9 years of sales work in the company's Chicago area and as manager of western district sales, as well as production work at the Eddystone, Pa., and Granite City plants.

♦ ♦ ♦

Earl M. Douglas was recently appointed general manufacturing manager in charge of foundry, engine, transmission, axle, forge and machining operations, Studebaker-Packard Corp., Detroit. He will be in charge of the new engine and transmission plant in Utica, Mich., the Detroit

(Continued on page 114)

Saves DOLLARS As It Solves Dust Problems!

Engineered simplicity of Type N ROTO-CLONE assures highest efficiency— lowest maintenance costs

Why does ROTO-CLONE cost less to maintain? Unique design of Type N achieves the ultimate in simplicity without sacrifice of efficiency. This wet-type collector circulates water without the aid of pumps and nozzles; features entrainment separators requiring little or no attention; has an interior face free of projections, ledges or restricted passages to accumulate collected material and, through re-use of water, cuts operating costs.

Why are space requirements less? ROTO-CLONE* provides everything you need, except duct connections, in one complete shop-assembled package—collector, exhauster, motor, drive and dust storage hopper. This compactness makes its relocation easy and economical with change in process, plant layout or production equipment.

Why is performance outstanding? The high cleaning efficiency of this hydro-static precipitator results from the combined action of centrifugal force and through intermixing of water and dust-laden air. Such difficult materials as magnesium dust, buffing dust, lead oxide, lime and abrasive dust are routine assignments for the Type N ROTO-CLONE. What's more, the Type N's compensating water level feature permits maintaining this high cleaning efficiency over a wide range of exhaust volumes. And, with material collected as a sludge or slurry, there's never a secondary dust problem in disposing of the collected material.

Type N Precipitators are available in exhaust volumes up to 50,000 cfm. For complete information, call your local AAF representative, or write direct for Bulletin 277.

Type N ROTO-CLONE Arrangement D designed for continuous sluicing of sludge. Other arrangements are available for either manual removal or continuous disposal of the sludge.

AAF herman nelson

American Air Filter
COMPANY, INC.

266 Central Avenue, Louisville 8, Kentucky • American Air Filter of Canada, Ltd., Montreal, P. Q.

A. C. DENISON
. . . *becomes board chairman*

JOHN DAVENPORT
. . . *secretary, Fulton Foundry*

FRANK L. BARTON
. . . *Fulton Foundry pres.*

EDWARD D. BOYLE
. . . *equipment sales, Seattle*

(*Continued from page* 112)
forge plant, Detroit foundry, and the South Bend, Ind., engine and foundry facilities. Mr. Douglas, who joined Studebaker in 1927, headed the Los Angeles plant from 1947 until 1954, when he returned to South Bend.

♦ ♦ ♦

A. C. Denison, for over 26 years president of Fulton Foundry & Machine Co., Cleveland, has become chairman of the board of directors. He will remain active in supervision of metallurgical controls, research and product development, working with **Frank L. Barton,** who has succeeded him as president. A graduate of Case School of Applied Science, Mr. Denison joined Ferro Machine & Foundry Co., Cleveland, in 1910. Later he was associated with Fulton Foundry, until 1921, when he was named manager of Euclid Foundry Co., Euclid, O. He returned to the Fulton organization in 1928 as president. He is a former president of the Northeastern Ohio Chapter of the AFS, and of the Gray Iron Founders' Society. Mr. Barton, associated with the company over 38 years, became vice president-general manager in 1946. **John Davenport,** recently assistant to the president, has been made secretary of the company.

♦ ♦ ♦

Fred W. Fisher, for the last 8 years sales engineer in the Philadelphia office, Whiting Corp., Harvey, Ill., has been named manager of a new sales office at 1610 Liberty Life Bldg., Charlotte, N. C. Mr. Fisher is a graduate of Purdue University and did postgraduate work at Drexel Institute of Technology. **Harvey K. Waters,** formerly in the Birmingham sales district, will assist Mr. Fisher in Charlotte. He is a graduate of Michigan College of Mining and Technology. **T. L. Iwan** has been appointed sales engineer in the Philadelphia district office. He joined the Harvey plant in 1927 and attended University of Chicago. **A. H. B. Stensland** has been assigned to the Pittsburgh district office. He attended University of Minnesota and University of North Dakota and for the past year was in Whiting's sales training program.

Edward D. Boyle, since 1944 master molder, Puget Sound Naval Shipyard, Bremerton, Wash., recently retired after 38 years of service. He worked in the pattern shop 2 years and was transferred to the foundry, where he held supervisory positions since 1933. Mr. Boyle has been appointed manufacturer's agent in Seattle for SPO Inc., Cleveland, National Engineering Co., Chicago, Whiting Corp., Harvey, Ill., and other equipment suppliers. One of the organizers of the Washington Chapter of the AFS, he later served as its president, and has presented papers before various foundry groups on the use of mineral perlite.

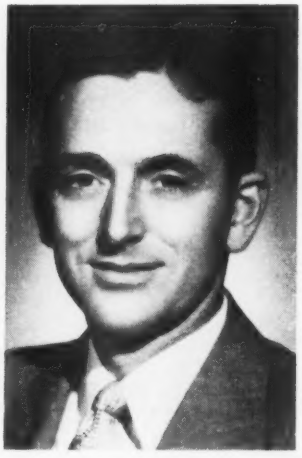
♦ ♦ ♦

Harry E. Ladwig, since 1944 works manager of the West Allis foundries and pattern shops, Allis-Chalmers Mfg. Co., Milwaukee, has been appointed foundry consultant. Mr. Ladwig joined the company in 1909, after completing special business school training. Starting in the foundry, he also served in the pattern shop, shipping room, machine

(*Continued on page* 117)

HARVEY K. WATERS
. . . *Whiting sales, Charlotte*

A. H. B. STENSLAND
. . . *Pittsburgh sales, Whiting*



FRED W. FISHER
. . . *manages new office*

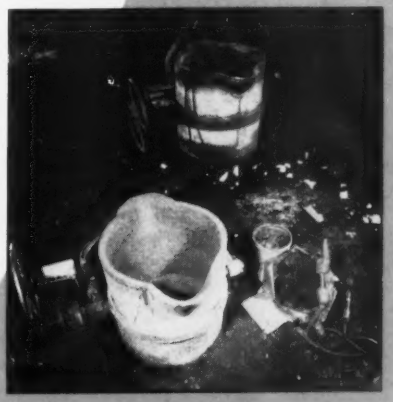
T. L. IWAN
. . . *Whiting Philadelphia sales*

NARCOLINE

slag-resistant plastic refractory

First step — Jackson lining ladle bottom with Narcoline.

Pinning slab of Narcoline at side of ladle. Below—Completed job.



If slagging is your problem recent actual tests made with the new Narcoline Slag Resistant Plastic should interest you. These tests proved that Narcoline not only gives greatly increased lining life but the linings wear back uniformly without thin spots. It was also demonstrated that Narcoline not only gives longer service but also reduces thicknesses of lining required, thus providing added capacity to the ladle.

Besides being more resistant to slag erosion than ordinary fire clay linings, other advantages of Narcoline include greater ease of application and reduction of lining time.

Sam Jackson, cupola tender for the H. G. Enderlein Co. of Philadelphia, maintains that he can line a ladle with Narcoline in less time than with any other product and also that this Narcoline lining will give longer trouble-free service.

It is in contact with molten metal or in applications where reducing conditions exist that Narcoline provides the most satisfactory service. However, under strongly oxidizing conditions Narcoline serves as a super duty plastic with all the high refractoriness and superior resistance to slag attack and spalling of the best of that class of product. Narcoline D is a dry form of this plastic refractory also available from NARCO.

Write for complete information on how Narcoline can solve your perplexing problems.

NORTH AMERICAN REFRACTORIES COMPANY

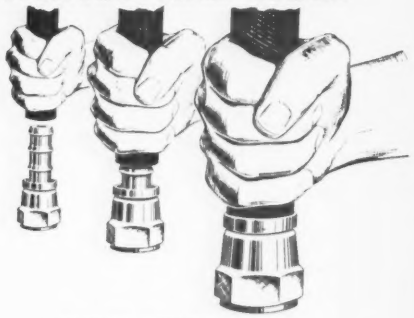
GENERAL OFFICES, CLEVELAND 14, OHIO

NEW YORK 7—50 Church St. | BUFFALO 3—703 Ellicott Sq. Bldg. | CHICAGO 5—59 E. Van Buren St.
PHILA. 2—906 Blue Cross Bldg. | PITTS. 22—1938 Oliver Bldg. | CINCINNATI 16—22 Woodsdale St.
BOSTON 18—516 Albany St. | DETROIT 2—Curtis Bldg. | SYRACUSE — 238 Harrison St.

NORTH AMERICAN REFRACTORIES LTD. 191 Victoria Ave., So. HAMILTON, ONTARIO

make extra tough foundry hose lines like these IN SECONDS!

WITH NEW AEROQUIP SOCKETLESS FITTINGS AND HOSE



PATENT APPLIED FOR

Aeroquip presents a new extra-tough hose built to take the abrasion, heat, flexing and squashing encountered in foundry operation.

Aeroquip *SOCKETLESS* fittings and hose assemble in seconds to make long-lasting foundry air lines. Just cut the hose to length and push it on the *SOCKETLESS* fittings. Fittings won't blow off even at pressures as high as 250 p. s. i. Also makes water, oil and fuel lines.

This new Aeroquip product reduces your hose line inventory to a small supply of low-cost bulk hose and detachable, reusable fittings. See your distributor or write for information.

Aeroquip

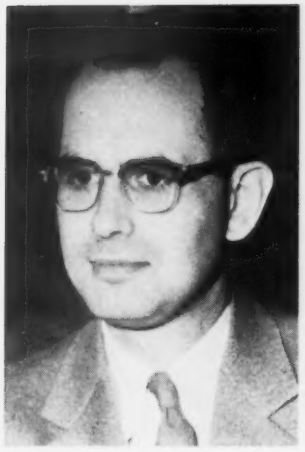
REG. TRADE MARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN

LOCAL REPRESENTATIVES IN PRINCIPAL CITIES IN U.S.A. AND ABROAD • AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

JAMES W. HIGLEY
. . . joins Davenport Machine

CHESTER E. AULT
. . . Link-Belt sales, Chicago



DEAN BURGAN
. . . metallurgical supervisor

DR. WILLIAM H. RICE
. . . technical consultant, ESCO

(*Continued from page* 114)
shops and office. He is a past president of the National Foundry Association and of the Wisconsin Chapter of the AFS. **Anthony Lebesch,** assistant works manager, has succeeded Mr. Ladwig as works manager of the West Allis foundries and pattern shops. Mr. Lebesch joined the company as an apprentice in 1924.

♦ ♦ ♦

James W. Higley, until recently foundry engineer, Mechanical Handling Systems Inc., Detroit, was recently appointed sales engineer, Davenport Machine & Foundry Co., Davenport, Iowa. He attended Iowa State College and subsequently was associated with John Deere Tractor Works, Waterloo, Iowa, Lester B. Knight & Associates and Hills-McCanna Co., both of Chicago.

♦ ♦ ♦

Arthur W. Fasold has been named assistant to the general sales manager of the conveyor and rubber divisions, Hewitt-Robins Inc., Stamford, Conn. A graduate of University of Cincinnati, Mr. Fasold joined the company in 1947 as an estimator in the Charleston, W. Va., office, became a field engineer the following year and last year was named assistant manager of the company's commercial research department in Stamford.

♦ ♦ ♦

Dr. Robert H. Krieble has been appointed manager of the chemical development department, Chemical and Metallurgical Division, General Electric Co., Pittsfield, Mass., succeeding **Dr. Alphonse Pechukas,** who has become consultant, materials and processes, Engineering Services Division. Dr. Krieble joined the company's research laboratory in Schenectady, N. Y., in 1943 and since 1952 had been manager of engineering.

Chester E. Ault was recently appointed assistant sales manager for Link-Belt Co.'s Pershing Road plant, Chicago, succeeding **Andrew K. Kolar** who has been named purchasing agent there. Mr. Ault attended Purdue University and joined the company in 1924. For the last 4 years he was manager of belt conveyor idler sales, with headquarters at the company's Ewart plant in Indianapolis.

♦ ♦ ♦

Clarence E. Hawke, vice president of the Carborundum Co. and general manager of its Refractories Division, Perth Amboy, N. J., has retired from active direction of the division. As a vice president of the company and special consultant to the president, he will give particular attention to the development and marketing of a new ceramic fiber product developed by Carborundum. **Boyd M. Johnson,** recently assistant general manager, has been appointed general manager of the Refractories Division. He joined the company in 1920 following graduation from University of Pennsylvania.

♦ ♦ ♦

William H. Kushnick has been appointed executive director, Instrument Society of America, with headquarters in the national office in Pittsburgh where he will also act as publisher of the *ISA Journal,* the society's monthly publication. A graduate of New York University, he was formerly director of the School of Management, American Management Association, New York.

♦ ♦ ♦

John S. Owen, executive vice president, First Wisconsin National Bank, Milwaukee, has been elected a director, Sivyer Steel Casting Co., there, to fill the unexpired term of the late William C. Frye, former president of Chain Belt Co., Milwaukee.

Dean Burgan and **Dr. William H. Rice** have joined the technical staff, Electric Steel Foundry Co., Portland, Oreg. Mr. Burgan, who will work with other supervisors in the metallurgical department, is a graduate of Ohio State University. For the past 12 years he was engaged in research work with Battelle Memorial Institute, Columbus, O. Dr. Rice will work on cast weldment design and cast fabrications and serve as consultant on problems related to welding of high alloys. For 15 years he was head of the welding department, Oklahoma Agricultural and Mechanical College. Recently he was engaged in work on his doctorate at Oregon State College.

♦ ♦ ♦

John E. Fahlman, since 1953 general manager and assistant secretary, the Permold Co., Medina, O., has been appointed executive vice president and will continue as assistant secretary. Mr.Fahlman was graduated from University of Michigan in 1946. He started to work in the company's shipping department while in high school and has worked continuously in various departments except for time spent at school and military service between 1943 and 1945. In 1951 and 1952 he spent ten months with the Aluminum-Magnesium Division, NPA, Washington.

♦ ♦ ♦

Harry C. Platt, since 1949 vice president, Engineered Castings Division, American Brake Shoe Co., Rochester, N. Y., has been named executive vice president of the division. Mr. Platt joined the company in 1942 following graduation from Massachusetts Institute of Technology, and served as a metallurgist in various divisions until 1949.

♦ ♦ ♦

Clinton B. Fleming has been appointed chief industrial engineer, Laclede-Christy Division, H. K. Porter Co., St. Louis, Mo. Mr. Fleming is

DAN PENDERGAST
. . . New England district mgr.

WILLIAM J. FERRICK
. . . sales mgr., Wilton Tool

ALEX J. VOGL
. . . Wilton Tool v. p.

G. RAY FRIEDRICH
. . . Beardsley & Piper sales

a graduate of University of Buffalo and previously was plant engineer, Buffalo Steel Division, H. K. Porter Co., Pittsburgh, and industrial engineer, Kimberly-Clark Corp., Niagara Falls, N. Y.

♦ ♦ ♦

Dan Pendergast has been appointed New England sales representative, Foundry Products Division, Archer-Daniels-Midland Co., Cleveland, and New England district manager, Sterling Wheelbarrow Co., Milwaukee, with headquarters in Boston. Mr. Pendergast succeeds the late Ray Hunter, with whom he worked in the New England territory. A graduate of Boston College, he was previously associated with Waltham Grinding Wheel Co., Waltham, Mass., and Foundry Division, Wilson Industries, Cambridge, Mass.

♦ ♦ ♦

James B. Morey has been placed in charge of the Cincinnati technical field section, Development and Research Division, International Nickel Co., New York. He succeeds **C. T. Haller Jr.,** who now heads the Pittsburgh technical field section. Mr. Morey was graduated from Cornell University and joined the company in 1939. Previously he was associated with Atlas Crucible Steel Co., Dunkirk, N. Y., Southern California Edison Co., and Morey & Jones Ltd., Los Angeles.

♦ ♦ ♦

Alex J. Vogl has been appointed vice president-sales, Wilton Tool Mfg. Co., Chicago. **William J. Ferrick,** formerly assistant sales manager, has succeeded Mr. Vogl as sales manager.

♦ ♦ ♦

Frank Weir, since 1949 Pittsburgh district sales manager, Harbison-Walker Refractories Co., Pittsburgh, has been appointed assistant general sales manager. Mr. Weir joined the company in 1923 and served as sales representative in New York, Boston, Buffalo, and for 3 years as St. Louis district sales manager.

♦ ♦ ♦

E. J. Fox has been appointed division sales manager, Cement-Coke Division, Diamond Alkali Co., Cleveland. **William R. Greenlee** has succeeded Mr. Fox as manager of cement sales. **M. L. Huemme** continues in charge of coke and coke by-product sales. Mr. Fox joined the company in 1925, after 10 years with Lehigh Portland Cement Co., Allentown, Pa. He served as a salesman until 1946, when he became special staff assistant, and in 1951 was named manager of cement sales.

♦ ♦ ♦

G. Ray Friedrich has been appointed sales representative, Beardsley & Piper, Division of Pettibone Mulliken Corp., Chicago, to cover southern Illinois, western Indiana, western Tennessee, Arkansas, Colorado, Kansas, Louisiana, Missouri, Oklahoma and Texas. Mr. Friedrich has been a service representative for the company for the past 7 years.

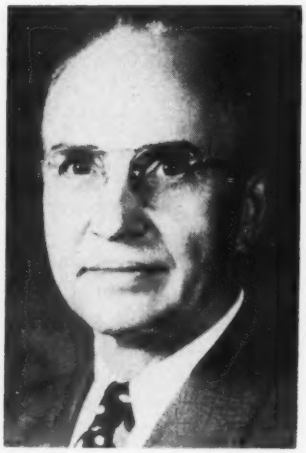
♦ ♦ ♦

Herbert H. Meinert has been appointed Michigan representative, United States Graphite Co., succeeding the late Arthur J. Heindel. A graduate of Loyola University, Baltimore, Mr. Meinert joined the com-

(*Concluded on page* 120)

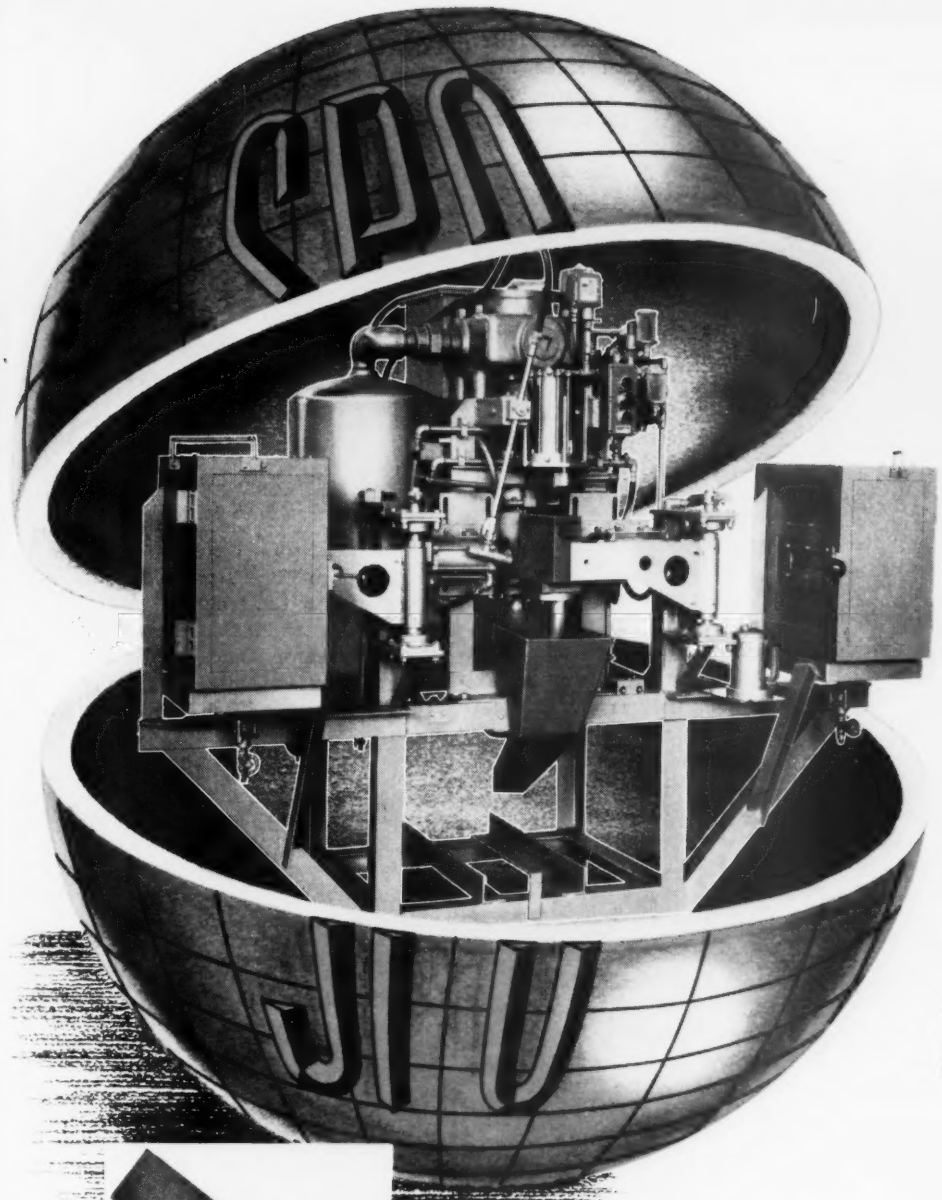
JAMES B. MOREY
. . . technical research, INCO

FRANK WEIR
. . . Harbison-Walker sales



E. J. FOX
. . . Diamond Alkali sales mgr.

HERBERT H. MEINERT
. . . U. S. Graphite sales



SPO does it again!

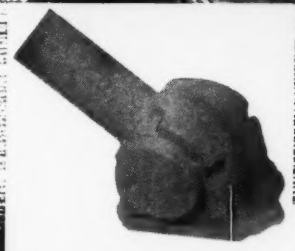
the world's first HOLLOW CORE machine

Here's another first by SPO to open new horizons in precision molding... a machine designed to produce uniform standard *hollow cores.* These hollow cores assure closer tolerances... eliminate venting problems... permit faster and easier core shake-out. They also require less curing time... can be made faster.

The new SPO Model 10 Hollow Core Machine makes finished cores in a 45-second cycle without the use of separate dryers or core ovens. All operations except positioning of coreboxes and core removal are automatic. In addition, absolute accuracy of finished cores is assured because they are not removed from box or handled until cured and ready to use.

A two-station machine requiring only one operator, Model 10 can be installed in molding machine lines to speed up production. This versatile machine combines simplicity of operation with famous SPO accuracy and dependability to give new precision and economy in core production and finished castings.

Write today for complete details.



• ASSURES CLOSER TOLERANCES

• ELIMINATES VENTING PROBLEMS

• PERMITS EASIER SHAKE-OUT

WORLD'S LARGEST SUPPLIERS SPO OF MOLDING MACHINES

SPO INCORPORATED

6449 Grand Division Avenue

Cleveland 25, Ohio

6084-SI

CLARENCE S. WENTWORTH
. . . becomes regional sales mgr.

(*Concluded from page* 118)
pany following discharge from military service in Korea. He will make his headquarters in Saginaw, Mich.

♦ ♦ ♦

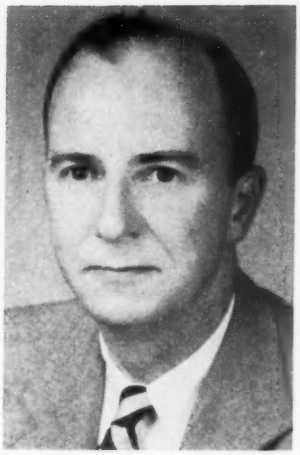
Clarence S. Wentworth, since 1950 Detroit district manager, Worthington Corp., Harrison, N. J., has been named central region sales manager, succeeding **William A. Meiter,** recently named general sales manager. Mr. Wentworth was graduated from Northeastern University and joined the company in 1922. He was assigned to sales in the St. Louis office from 1929 to 1936, when he became regional manager of the railroad division, in St. Louis and Chicago. He was transferred to the Chicago sales office in 1948.

♦ ♦ ♦

W. W. Adcock has been appointed manager of the Fort Smith, Ark., office, Corn Products Sales Co., New York. Mr. Adcock joined the Little Rock, Ark., office of the company in 1919. Later he became branch manager in Memphis, Tenn., and in 1944 went to Dallas, Tex., to manage a newly opened office covering northern Texas and Louisiana.

♦ ♦ ♦

H. T. Coghill has joined the Cincinnati sales staff, Refractories Division, the Carborundum Co., Niagara Falls, N. Y. Mr. Coghill attended Antioch College and University of Michigan. For 12 years he was associated with the technical staff, American Cyanamid Co., New York, and then became Chicago district manager, Ampco Metal Inc., Milwaukee. After 6 years he became a manufacturers' agent, serving the metallurgical and process industries.



H. T. COGHILL
. . . joins Carborundum Co.

♦ ♦ ♦

J. F. Wallace has been appointed associate professor, Department of Metallurgical Engineering, Case Institute of Technology, Cleveland, in charge of the department's expanded activities in metal processes. Mr. Wallace was formerly director, Rodman Laboratories at Watertown Arsenal, Boston.

♦ ♦ ♦

Leo J. Gardner has been appointed sales representative, Newaygo Engineering Co., Newaygo, Mich., to cover all of Ohio except the northeastern section. Associated with the foundry industry over 20 years, Mr. Gardner served with Harsch Bronze Foundry, Cleveland, and later with the Williamsport, Pa., division, Avco Corp., New York. For a time he operated his own foundry in Cleveland.

♦ ♦ ♦

Leonard J. Shorek was recently appointed engineer - representative, Hauck Mfg. Co., Brooklyn, N. Y., to handle the company's line of industrial oil and gas burning equipment in the Detroit area.

♦ ♦ ♦

Ted E. Grimac recently was appointed district manager in eastern Pennsylvania and southern New Jersey, Catalytic Combustion Corp., Detroit, with headquarters in Elkins Park, Pa.

Foundryman Retires After 45 Years of Service

A CAREER in the foundry industry that began 45 years ago came to a close recently when **Henry B. Hanley** retired from service with the Foundry Division, American Laundry Machine Co., Rochester, N. Y. He had been connected with that company for 25 years.

HENRY B. HANLEY

After attending Brown University, Providence, R. I., and studying metallurgy under Albert Sauveur of Harvard, Mr. Hanley studied also with Dr. Richard Moldenke, whom he followed in pioneering early work on sand research and technology in this country. He created the Hanley patent on production of synthetic molding sands.

During World War I, Mr. Hanley was metallurgist and foundry superintendent at New England Ship & Engine Co., Groton, Conn., which built Augsburg-Nuremburg four-cycle diesel engines for submarines. The firm supplied subs to Spain, England and Chile, as well as to the U.S.A. At this plant, Mr. Hanley installed the first electric furnace for melting steel in New England and pioneered in heat treating high-test irons and establishing physical structure examinations.

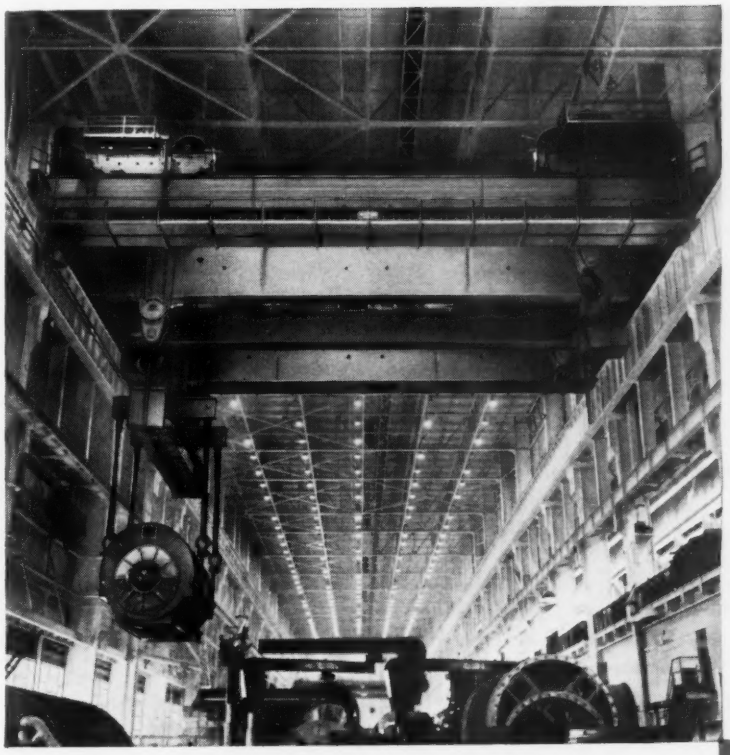
At American Laundry Machine Co., the foundry division of which he was manager produced approximately $30 million worth of rough castings plus millions of dollars worth more for outside firms during his extended period of service.

Mr. Hanley was, at various times, a director of the American Foundrymen's Society and the Gray Iron Founders' Society; vice president, Meehanite Research Association of America, and founder and first president of the Rochester Chapter, AFS. He prepared the first American exchange paper, for the 1922 International Foundry Congress, in Paris.

heavy handling costs less

WITH A

Whiting Crane!



The overhead crane that saves its user money is one that is *just right* for its specific job. "Too little" crane is as costly as "too much" crane. Whiting —with more than 60 years' experience in crane construction for firms throughout industry— engineers "just enough" crane for *future* as well as *immediate* needs. More efficient crane operation also helps to lower costs. For example, the new Whiting Selectodyne controls assure the fastest, most accurate lifting, moving and spotting. Ingenuity of Whiting Crane design makes possible large savings in maintenance. Better materials are used in Whiting Cranes . . . anti-friction bearings and precision-made gears reduce friction and wear problems . . . securely-fitted shafts and flanged couplings that stay tight provide peak performance. These, and many other outstanding Whiting Crane features mean a longer, trouble-free life that results in low-cost handling! Before you invest in any crane . . . investigate the Whiting Crane!

WHITING CORPORATION
15607 Lathrop Avenue, Harvey, Illinois

Write for the new Whiting Crane Bulletin—Unit 80 . . . gives complete information on the 14 outstanding Whiting Crane features! Send for it today!

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Whiting also manufactures...

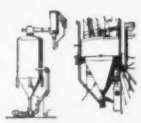
Hoists

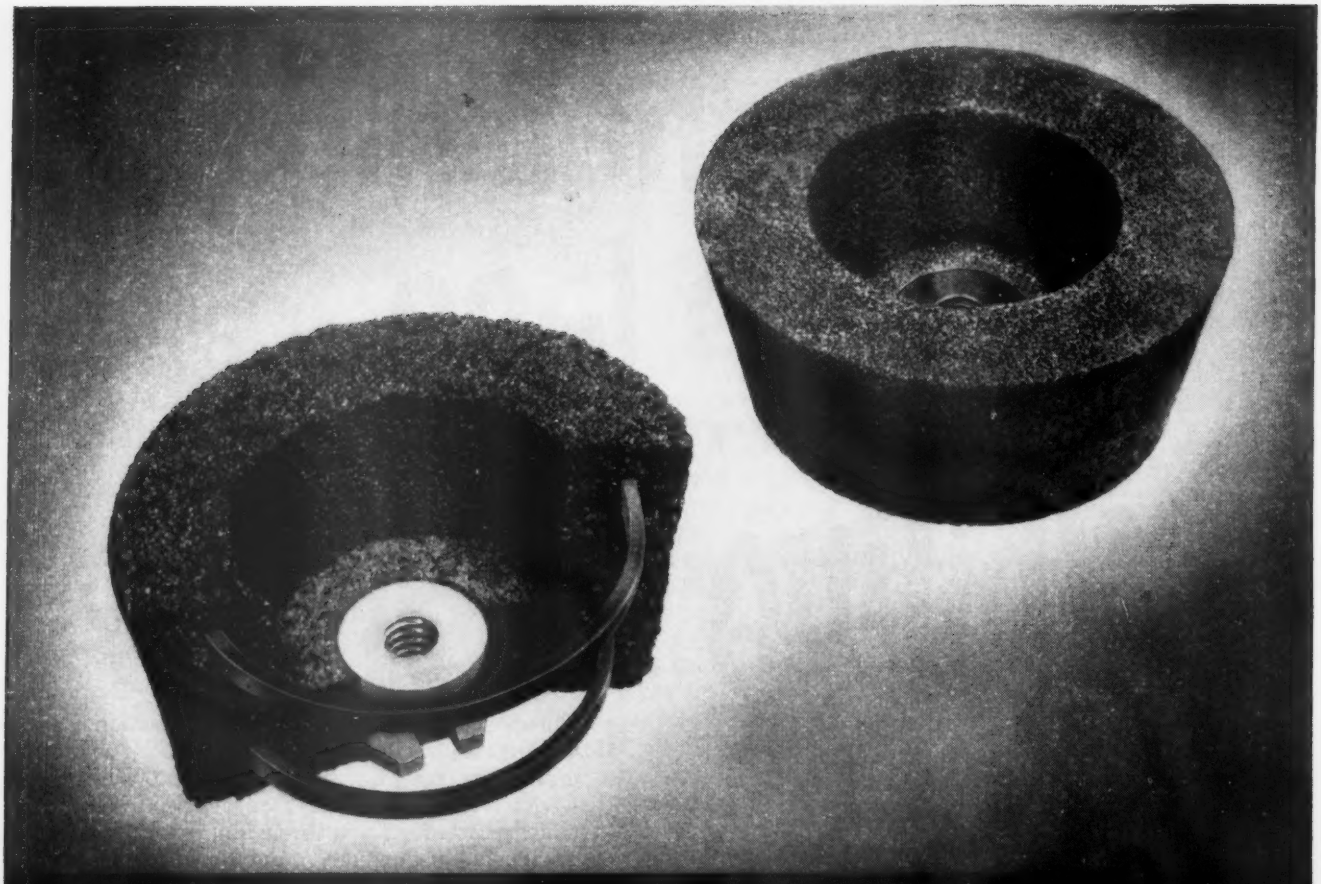
Trackmobiles

Trambeam Systems

Foundry Equipment

Railroad Equipment

Chemical Equipment 



NOW! a new safety concept in grinding wheels—

FOR PORTABLE GRINDERS

COLONIAL WHEELS . . . Equipped with GRINDAWAY* Safety Rings . . . PROVIDE AN INCREASED SAFETY FACTOR!

Increased safety in grinding wheels is now available! Colonial reinforced resinoid wheels for high speed, portable grinding are equipped with the revolutionary GRINDAWAY safety rings to provide greater safety at no sacrifice in grinding quality!

Made of a material having greater tensile strength than steel, Colonial GRINDAWAY safety rings can be inserted in the wheels where reinforcement is most needed . . . *in the actual grinding portion of the wheel.* This is possible since they abrade away as the wheel wears through them. Such reinforcement in the actual grinding portion of the wheel has never before been possible.

Colonial Abrasive Products Company offers GRINDAWAY safety rings in three types: straight, recessed, and flaring cups with grinding quality maintained in each and without premium cost.

New literature is available describing the construction, advantages, and prices of each type Colonial GRINDAWAY wheel. We invite you to write for your copy today.

*PATENT APPLIED FOR

COLONIAL ABRASIVE PRODUCTS CO.
SIXTH AND HARRY STREETS
CONSHOHOCKEN PENNSYLVANIA

DATA ON THE GRAY IRON INDUSTRY

Is Gathered by Gray Iron Founders' Society

THE automotive industry is the largest single consumer of gray iron castings. However, foundries supplying castings to several other industries exceed the number of those catering to the motor car field. This is one of numerous conclusions derived from the 1954 statistical survey completed recently by the Gray Iron Founders' Society.

A record number of 826 foundries participated in the survey. Based on production in the last six months of 1953, the questionnaires returned represented total average monthly shipments of 288,913 net tons of gray iron, 66 per cent of which was castings for sale and 34 per cent castings for own use. Over 85 per cent of the total tonnage reported was miscellaneous gray iron castings only.

An adjusted comparison was made of miscellaneous "for sale" and "own use" castings with U. S. Department of Commerce shipment figures. It indicates that the society's survey represents about 60 per cent of the entire industry's shipments of jobping, or for sale, castings and about 20 per cent of captive, or own use, castings produced in the last six months of 1953.

Mostly Jobbing Tonnage—A breakdown by types of foundries of figures reported on the survey shows that jobbing foundries produced 173,116 net tons (59.9 per cent), captive foundries 84,103 net tons (29.1 per cent) and semicaptive foundries 31,784 net tons (11.0 per cent) per average month. Those figures are for the second six months of 1953. By comparison, the figures for the first half of 1951, the best production period to date, are as follows: Jobbing foundries, 213,389 net tons (61.2 per cent); captive foundries, 102,459 net tons (29.4 per cent); semicaptive foundries, 32,994 net tons (9.4 per cent).

Foundries reporting ranged in size from those with fewer than 20 employees to those with 1000 and more. Of 824 which reported on their sizes, the breakdown looked like this: Under 20, 146; 20 to 49, 231; 50 to 99, 220; 100 to 199, 132; 200 to 299, 51; 300 to 499, 28; 500 to 999, 10; and 1000 or more, 6.

One-fifth Heat Treat—Response to a question concerning special facilities indicated that 2.06 produce centrifugal castings; 21.43 per cent have heat treating equipment; 24.82 per cent have laboratory facilities; 47.22 per cent have a machine shop; 2.30 produce permanent mold castings; 6.05 per cent produce shell mold castings; 24.70 per cent have a pattern shop for commercial sales; and 66.71 have a repair and maintenance pattern shop.

Perhaps the most interesting portion of the survey dealt with the gray iron industry's consuming industries. Results demonstrated that there usually was no particular correlation between the percentage of casting tonnage an industry consumed and the number of foundries which served the industry.

Autos Take 26 Per Cent—By far the greatest consumer, for example, is the automotive field, including replacement parts. It used 26.16 per cent of the casting tonnage, or nearly three times as much as the next consumer, but ranked seventh in the number of foundries which serve it —namely, 21.79 per cent. The field served by the most foundries was general machinery, supplied by 52.30 per cent but consuming only 6.43 per cent of the casting tonnage.

The following list gives, in order, the ten largest users of gray iron casting tonnage; figures in parentheses indicate the percentages of total tonnage they use: Automotive, including replacement parts (26.16); building and construction (9.54); utilities (8.53); machine tool (7.57); agricultural (6.74); rolling mill, steel plants (6.72); general machinery (6.43); household appliances (4.73); heating, including domestic, commercial and industrial heat treating (3.52); and petroleum (2.43).

The accompanying table showing a breakdown of gray iron casting use by industries covers shipments by foundries whose major products are miscellaneous castings. It does not include specialized items such as ingot molds, cast iron pipe or others of a similar nature.

Of the 826 foundries reporting, 94 per cent produce straight gray iron, 52 per cent can produce up to 3 per cent alloy irons and 20 per cent can produce over 3 per cent alloy irons. Cupolas are operated by 97 per cent of the reporting foundries and nearly 6 per cent employ electric furnaces.

Plant Mechanization — Degree of mechanization of reporting foundries varied directly with the size of plant. Only about 25 per cent of foundries with fewer than 100 employees were either partially or fully mechanized. In the size group with 100 to 200 employees, 32 per cent had some form of mechanization; this percentage increased to more than 50 per cent for the 200-300 employee group and to 75 per cent for the 300-500 employee bracket.

Molding Facilities—Breakdown of types of molding facilities of reporting foundries showed that 9 per cent of all plants made molds by all of five different methods—floor and bench molding, squeezer, rollover and stripper machines. Floor molding and use of squeezer machines are the most popular methods; 77 per cent of all foundries do the former type work and 62.5 per cent use squeezers. Blower units are employed by 41 per cent of all foundries and 17 per cent have stripper machines.

MAJOR CONSUMERS OF GRAY IRON CASTINGS

Industry	1953 Consumption by Industry, Per Cent	Per Cent of Foundries Serving Each Industry	Rank by Number of Foundries Serving Each Industry
Automotive*	26.16	21.79	7
Building and construction	9.54	31.60	4
Utilities	8.53	15.86	11
Machine tool	7.57	38.26	2
Agricultural	6.74	31.11	5
Rolling mill—steel plants	6.72	11.14	22
General machinery	6.43	52.30	1
Household appliances	4.73	13.68	16
Heating**	3.52	24.70	6
Petroleum	2.43	14.65	13
Municipal	1.52	21.31	8
Power transmission	1.46	10.77	24
Electrical motors and parts	1.37	16.22	10
Papermaking machinery	1.13	14.53	14
Material handling	1.07	15.74	12

*Includes replacement parts. **Includes domestic and commercial heating and industrial heat treating.

HERMAN

HERMAN

CHARGING CONVEYOR TYPE JOLT MACHINE for cores and molds

This HERMAN Molding Machine is ideal for either jobbing or production work. It is available in a wide range of capacities and sizes and can be used for the production of either cores or molds.

It has a high degree of flexibility, since it can be designed as a single unit, or in conjunction with the Herman Charging Conveyor Rollover and Draw Machine.

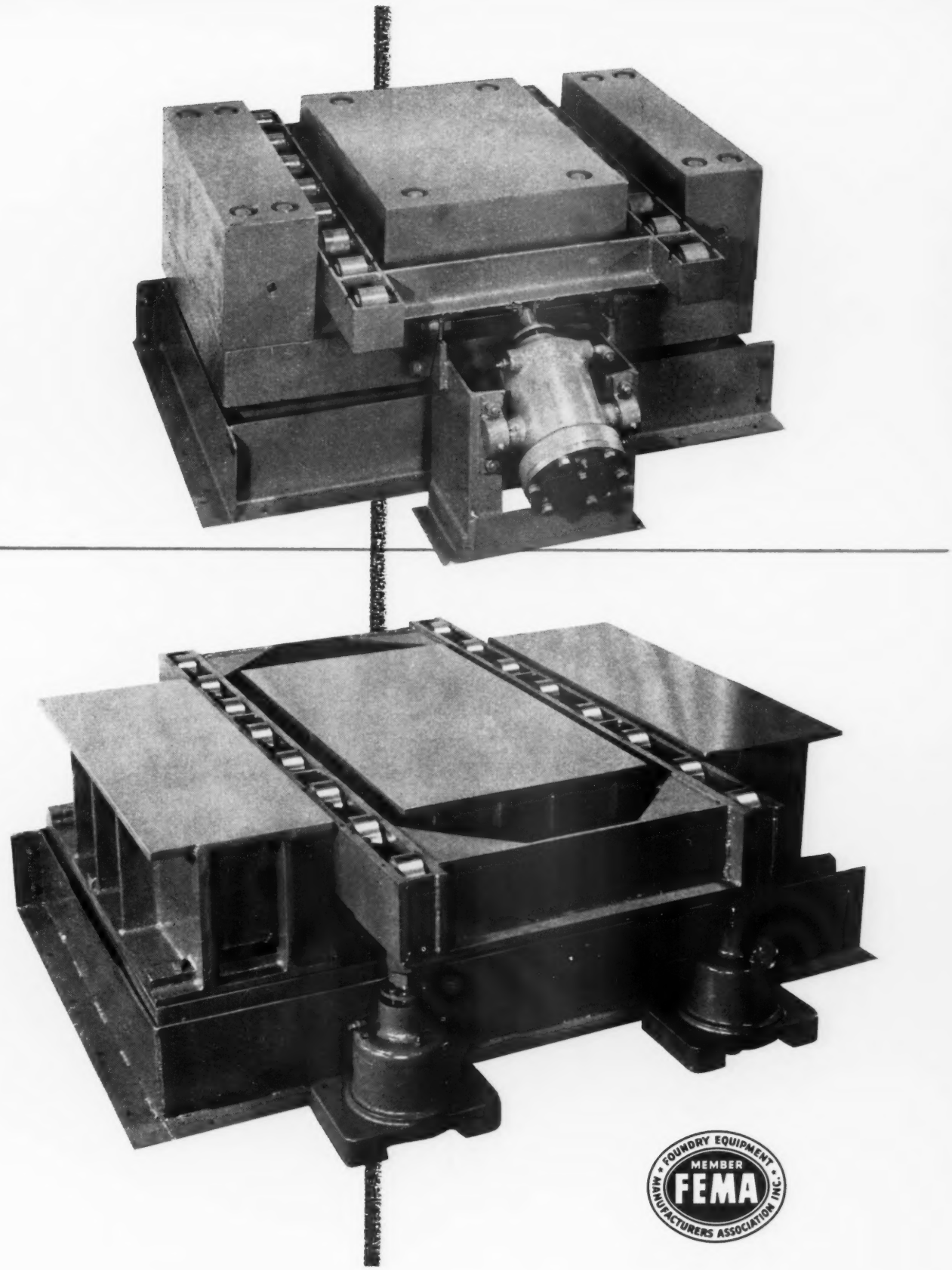
Flasks or coreboxes are filled directly on the machine or at a separate filling station. A power lift conveyor lowers the pattern and flask onto a stool on top of the table plate, for the jarring operation.

The rammed mold is elevated to the standard conveyor line.

This molding machine is another in the complete Herman line of efficient, economical units. Catalog No. GC-11-53 will give you more details . . . or call the Herman sales engineer in your area.

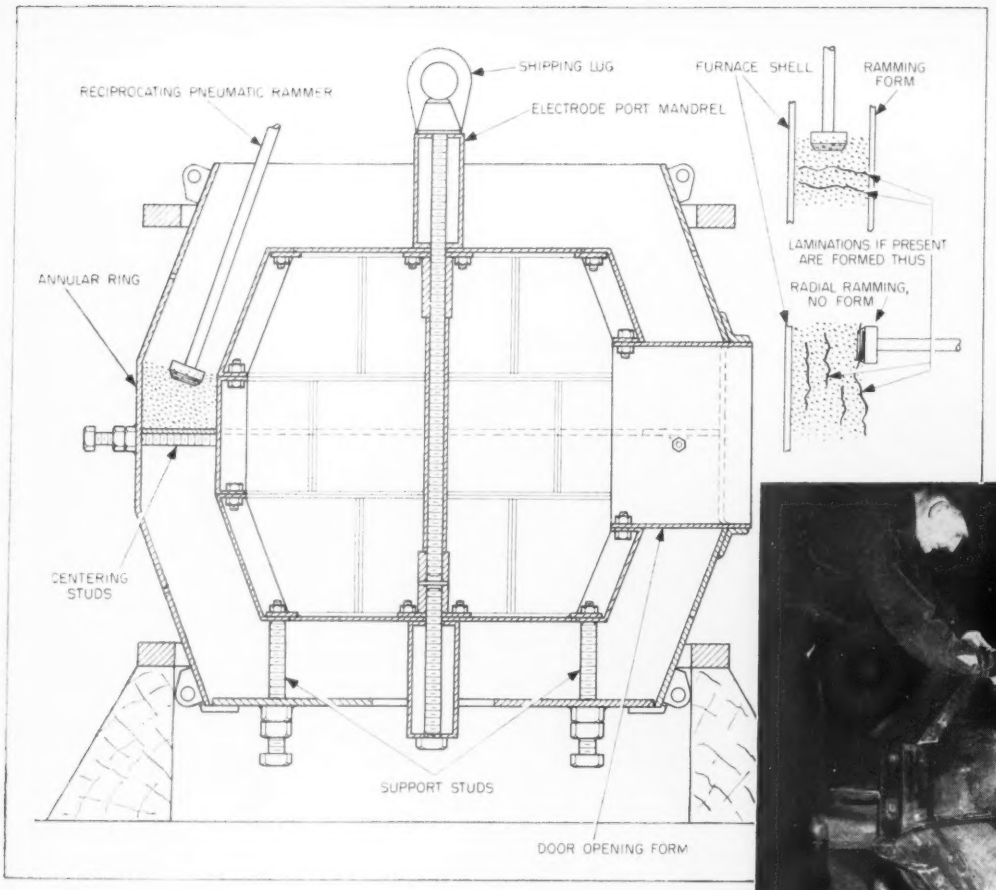
HERMAN PNEUMATIC MACHINE CO.,

UNION BANK BUILDING, PITTSBURGH 22, PA.



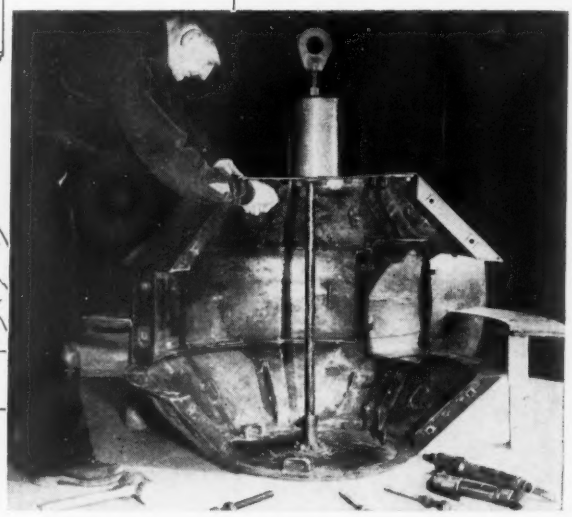
HERMAN

Best Known Name in Molding Machines



Left — Cross-sectional view of a furnace showing how refractory is rammed between shell and collapsible form

Below — Three main sections or annular rings make up the form which is assembled inside the furnace before ramming



RAMMED LININGS

For Indirect Arc Furnaces

By E. LENS JR.
Special Distributor
The Carborundum Co., Refractories Division
Perth Amboy, N. J.

IMPORTANT cost savings are said to result from use of a new rammed type of refractory lining in Detroit indirect arc electric furnaces. The lining and the technique for applying it were developed by the Carborundum Co.'s Refractories Division, Perth Amboy, N. J.

In addition to a long life, the lining offers these advantages:

1. Absence of slag formation and slag build-up on the lining face, thereby resulting in clean metal, maintenance of furnace capacity and avoidance of electrode breakage.

2. Elimination of patching except that required because of careless charging.

3. Consistent lining life, permitting closely scheduled relinings.

4. Increased furnace capacity because rammed lining thickness is usually about 1½ in. less than that of block lining.

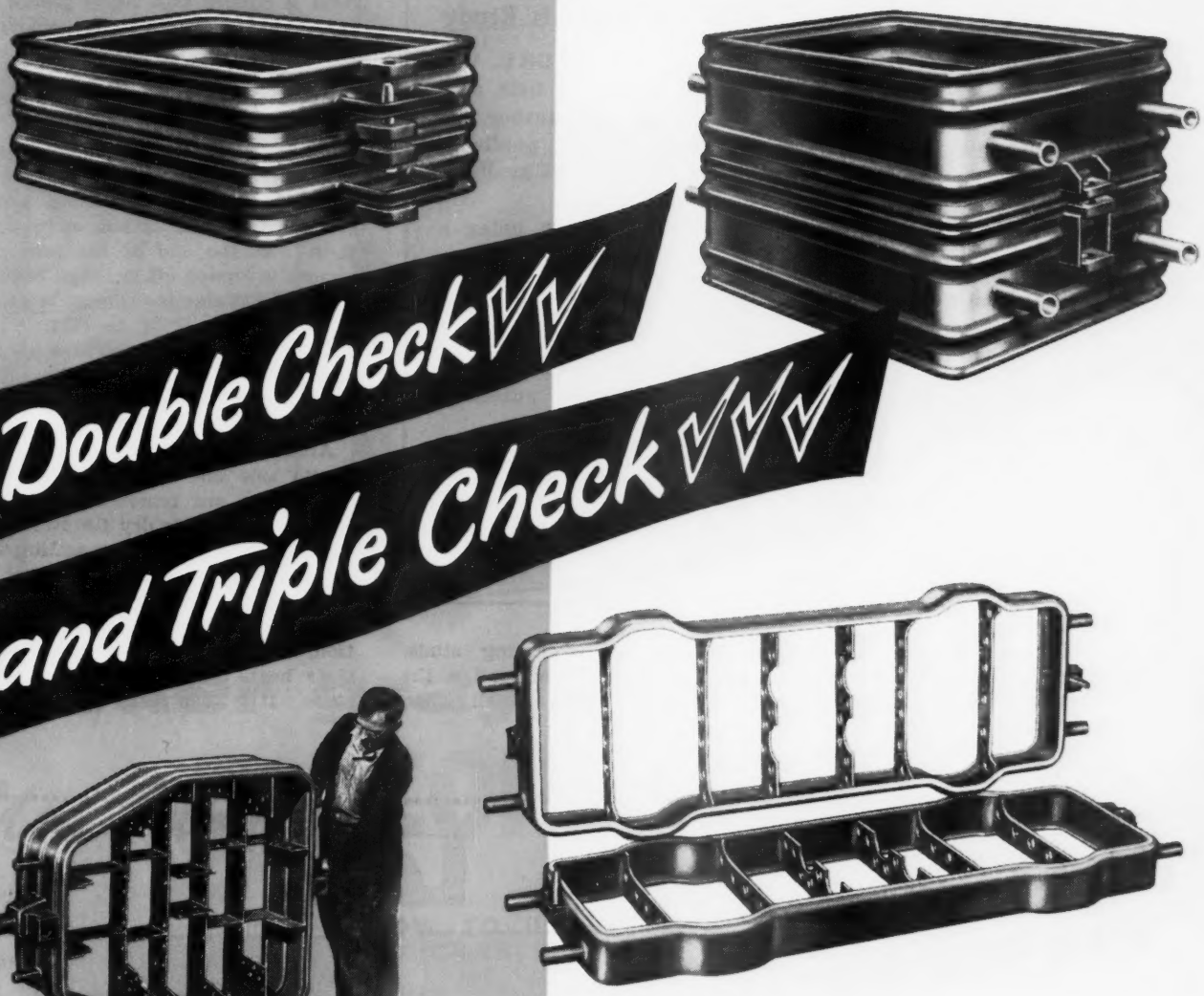
Typical installations give some indications of probable lining life. In one plant melting various nonferrous metals for the production of extrusions, the rammed linings have averaged about 1800 heats compared with 300 previously. A foundry producing brass plumbing fittings found a rammed lining still in good condition after 2400 heats with no patching except around the door. The prefired linings formerly used gave 2000 to 2500 heats but the amount of patching cement required was the equivalent of three linings.

In the past, prefired linings principally have been used. This was because: (1) they were relatively easy to install; (2) they had a fairly uniform density; and (3) existing ramming methods were not universally successful in providing a satisfactory lining. While the cement was less expensive than the prefired brick, cost of installation and wide variation in results gave a high refractory cost per pound of metal melted. Difficulties in installing a rammed lining were increased when a design change in the furnace made the shell conical instead of circular.

Both prefired linings and rammed linings, in general, are made from mullite materials produced by high-temperature calcination of kyanite, sillimanite, etc. and from electric furnace mullite. However, the depletion of high-grade sillimanite deposits in India and the absence of suitable new sources of supply have caused a drop in the performance of these refractories.

Carborundum's lining refractory is an electric furnace mullite cement consisting of closely controlled portions of alumina and silica. The material has a high degree of purity.

(*Concluded on page* 128)



In the Shanafelt plant every detail of your Flask is watched constantly. Your handles are placed exactly where you want them—your pin lugs line up perfectly—your bars are placed and notched just right.

When you receive a Shanafelt Flask it's ready for work—no alterations.

Such results come from a 56 year old manufacturing policy which stresses care, thoroughness, and accuracy. In this plant it's more than "check and double check" — we really "Double check and Triple check". Our long and impressive list of satisfied users proves the soundness of this policy.

When you're ready for new steel Flasks, we'd like to offer our estimates of cost and delivery.

The
SHANAFELT
Manufacturing Co.

ESTABLISHED 1893

2600-2700 WINFIELD WAY N.E., CANTON, OHIO

(*Concluded from page* 126)

containing a maximum amount of mullite crystals and a minimum of interstitial glass. At the same time slightly more alumina than the ideal mullite ratio (72 per cent alumina and 28 per cent silica) is used in the basic batch to assure that there is no excess silica.

Ramming technique developed for installing the lining employs a collapsible steel form; it is assembled inside the furnace and the cement is rammed between it and the shell, as shown in the accompanying illustration.

First step in the process is to lift the shell from its foundation. Both end disks are removed, a clipping arrangement is affixed to each, one disk is replaced and the shell stood upon the closed end. The ramming form, made in three major sections or annular rings, is fabricated from 3/16-in. cold-rolled steel plate. It is flanged and bolted with stiffening ribs to give additional strength.

Support and centering studs are threaded into place through the shell and a sectionalized starting ring is placed upon the centering studs. These studs support and align the form with the furnace shell when the form is lowered in place. The form is coated with liquid plastic to prevent oxidation and also provide a parting medium between cement and form. A separate form is used for the shell door, and mandrels provide the electrode port openings.

Mullite cement is rammed into place with a reciprocating type pneumatic rammer, the material being added gradually in fills of not more than ¾-in. At the end of the cone the cement is leveled off in rough fashion and castable alumina cement is added to a thickness of ¼ to ⅜ in. The end disk is seated in the alumina cement and clipped into place. The opposite end is treated similarly after the shell has been inverted.

After the shell has been placed on its side and the door form and main form are removed, the lining is permitted to air dry for two days. Further drying and heat setting are accomplished with a gas burner or in a drying room or core oven. The shell next is replaced on its foundation, the electrodes inserted and, from their heat, lining vitrification takes place. It is then ready for charging.

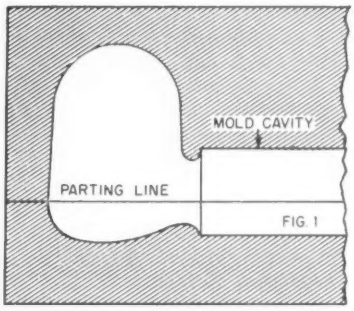
FOUNDRY Index Is Ready

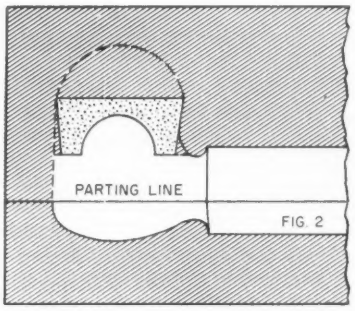
Index to FOUNDRY, Volume 82, listing by title, subject matter and author the editorial material published during 1954, now is available for distribution.

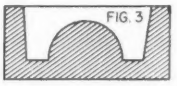
Readers find the index a ready reference to various phases of foundry practice, new techniques and recent developments in the industry and a quick means of locating information published during the year.

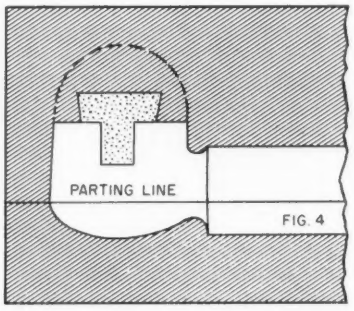
Subscribers may obtain copies without charge. Send your request to FOUNDRY, Penton Building, Cleveland 13, O.

HOW TO DO IT









Moldable Exothermic Materials In Blind Risers Increase Yield

By ORMIE R. SCOTT
Patternmaker
James R. Kearney Corp.
Guelph, Ont.

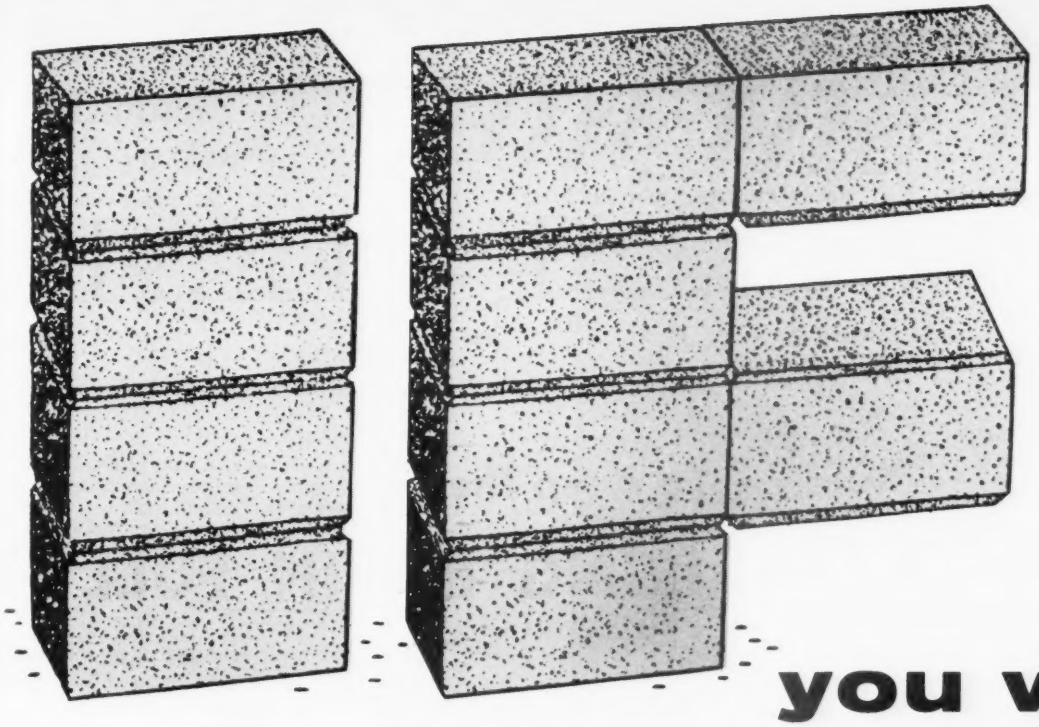
MOLDABLE exothermic materials are simple and economical to apply on blind risers, particularly where they are used on matchplate equipment. In such applications risers may be smaller than conventionally used and still make available molten metal for feeding the casting.

Outlined here is a simple method of utilizing molded exothermic shapes. Fig. 1 shows a conventional blind riser necessary to produce a sound casting. Fig. 2 shows the reduction achieved in the conventional riser through use of an exothermic cap rammed with the job. A semispherical protuberance is mounted on top of the abbreviated riser pattern and fits into a mating cavity in the cap to hold it in position during ramming. Cross-sectional view of the corebox to produce the exothermic cap is shown in Fig. 3.

Fig. 4 illustrates another type of exothermic core which is inserted in a hole in the riser pattern and rammed with the mold.

Moldable exothermic materials can be blown or hand-rammed in suitable boxes and oven dried. Such cores should be vented liberally.

Do you have any tricks of the trade tucked away with your foundry experience? Why not release them to fellow foundrymen? FOUNDRY will pay a minimum of $15 for each idea submitted and published. Send a photo or drawing with your idea.



you want better gray iron castings

Use Famous CORNELL CUPOLA FLUX

Here's why so many quality-conscious foundries use Famous Cornell Flux! Famous Cornell Flux causes a chemical reaction in molten iron which increases the amount of slag that floats off. Drops are cleaner and digging out takes less time, saving many man hours. Time-consuming and costly bridging over is practically eliminated. Sulphur is greatly reduced. All these dollar-saving advantages mean that the castings you get from iron purified with Famous Cornell Flux have greater tensile strength, are more easily machined and are uniformly hard throughout. Even the *appearance* of the castings is better.

HOW TO USE FAMOUS CORNELL FLUX

Famous Cornell Flux is made in easy-to-handle scored brick form. With each ton charge of iron, you simply toss one brick into the cupola. For charges less or more than a ton, you just break off a proportionate number of scored sections.

Famous Cornell Flux is the easiest and most economical way to insure that the metal that goes into your castings is free from foreign matter, a primary cause of casting rejects.

Why not contact your nearest Cornell engineer. He's always at your service. Or write for *Bulletin 46-B.*

HERE'S HOW FAMOUS CORNELL ALUMINUM AND BRASS FLUX *gives you 8 specific benefits*

- Makes metal pure and clean.
- Permits use of more scrap without danger of dirt, porous places or spongy spots.
- Thinner, yet stronger sections can be poured.
- Metal does not cling to the dross.
- Crucible or furnace linings are kept clean and preserved.
- Cleanses molten brass even when the dirtiest brass turnings or sweepings are used.
- Saves considerable tin and other metals.
- Forms a perfect covering over the metal during melting, prevents oxidation and reduces obnoxious gases to a great extent.

Write for Bulletin 46-A

The CLEVELAND FLUX Company

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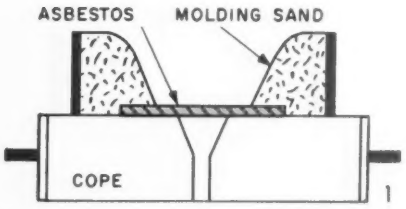
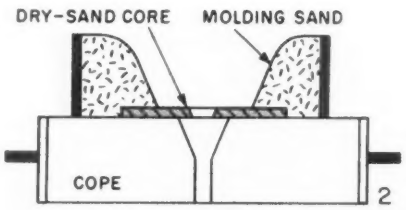
Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes—Since 1918

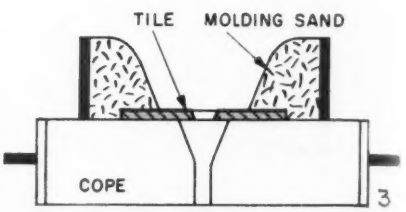
FAMOUS CORNELL FLUXES

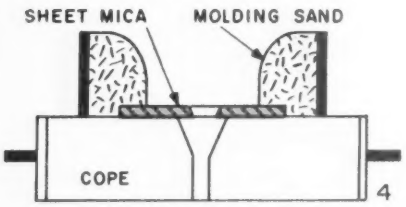
Trade Mark Registered

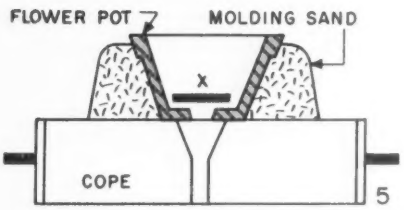
By C. W. AMMEN

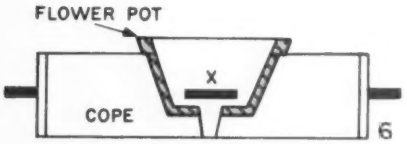


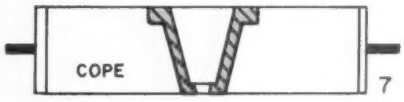


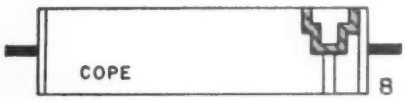


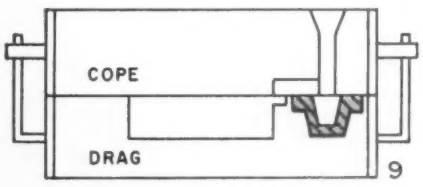


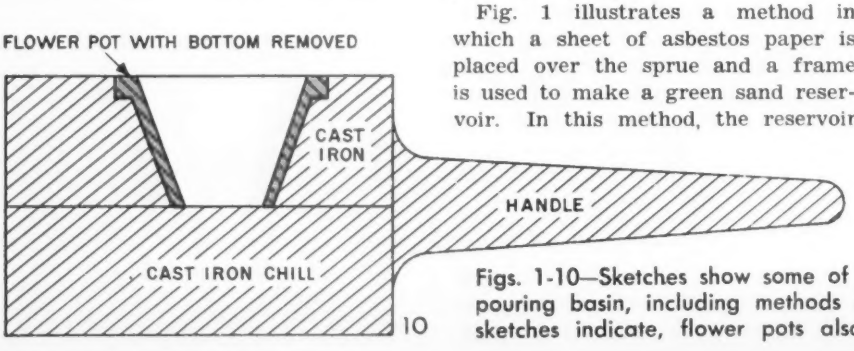












How To Keep the

POURING BASIN FULL

DEAR CHARLIE:

Have been running some very fussy jobs which we pour through the hub in the cope. Have had some fine results, but every now and then we get some dross and junk in the hub, caused, we think, by late or improper choke, sand wash, etc. Saw a movie, which you no doubt have seen, too, in which water was poured into lucite molds to show what happened with various gate ratios and designs. The pouring basin was plugged until full, and then a stopper was lifted, making it simple to keep it full and choked from there on. Would like to know whether there is any simple method of collecting the metal in a basin above the job, then letting it go. We have tried dry sand basins and graphite plugs with some success. How about it? Is there a simple way of doing this job?

SAM

DEAR SAM:

Well, old boy, there are a lot of ways to do what you want and to get good results. Of course, a properly designed gate should choke up almost the moment you start to pour. The accompanying sketches show some of the ways to do what you are looking for.

Fig. 1 illustrates a method in which a sheet of asbestos paper is placed over the sprue and a frame is used to make a green sand reservoir. In this method, the reservoir is filled and skimmed. A rod with a sharp point then is used to punch a hole through the asbestos, allowing the basin to empty into the sprue. Figs. 2, 3 and 4 show methods involving rods and clay or graphite stoppers.

Figs. 5 and 6 depict a little known but effective method which does the job inexpensively. Known as the flower-pot, delayed-pouring system it uses common unglazed red flower pots. Purchasable in sizes ranging from very large to very small, they have holes in the bottoms which easily can be chipped to larger sizes if necessary. A pot of the correct size is selected, placed in the core oven, carefully dried to remove moisture and allowed to cool in a dry place.

After the bottom hole has been chipped to the correct size, a disk is cut of whatever metal is to be cast. It should be large enough to cover the hole or, if desired, just a shade larger than the inside bottom diameter. If the larger size is used, the disk can be tapped into the bottom with a piece of wood so that it fits tightly, or it can be glued in with waterglass or with a strong core paste. The waterglass or paste must be dry before the pot is used. Thickness of the disk determines the time delay.

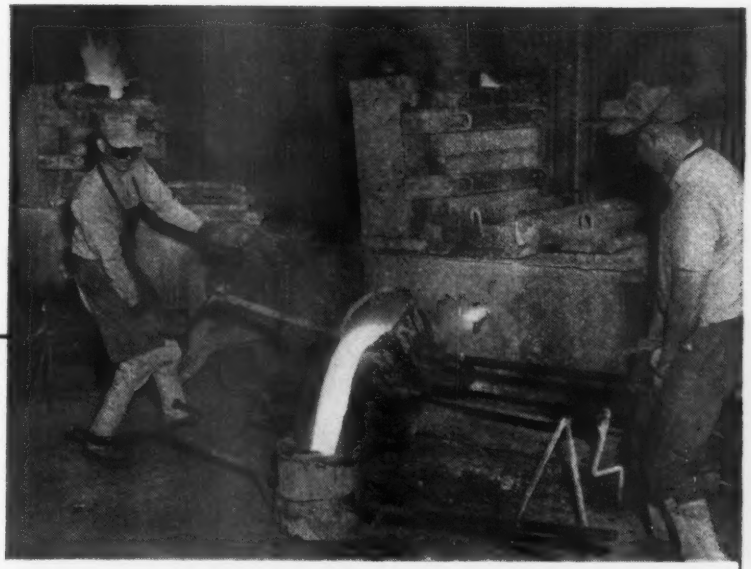
The flower pot is placed over the sprue and banked with molding sand. In operation, the pot or basin is filled quickly with metal and skimmed off.

(*Continued on page* 133)

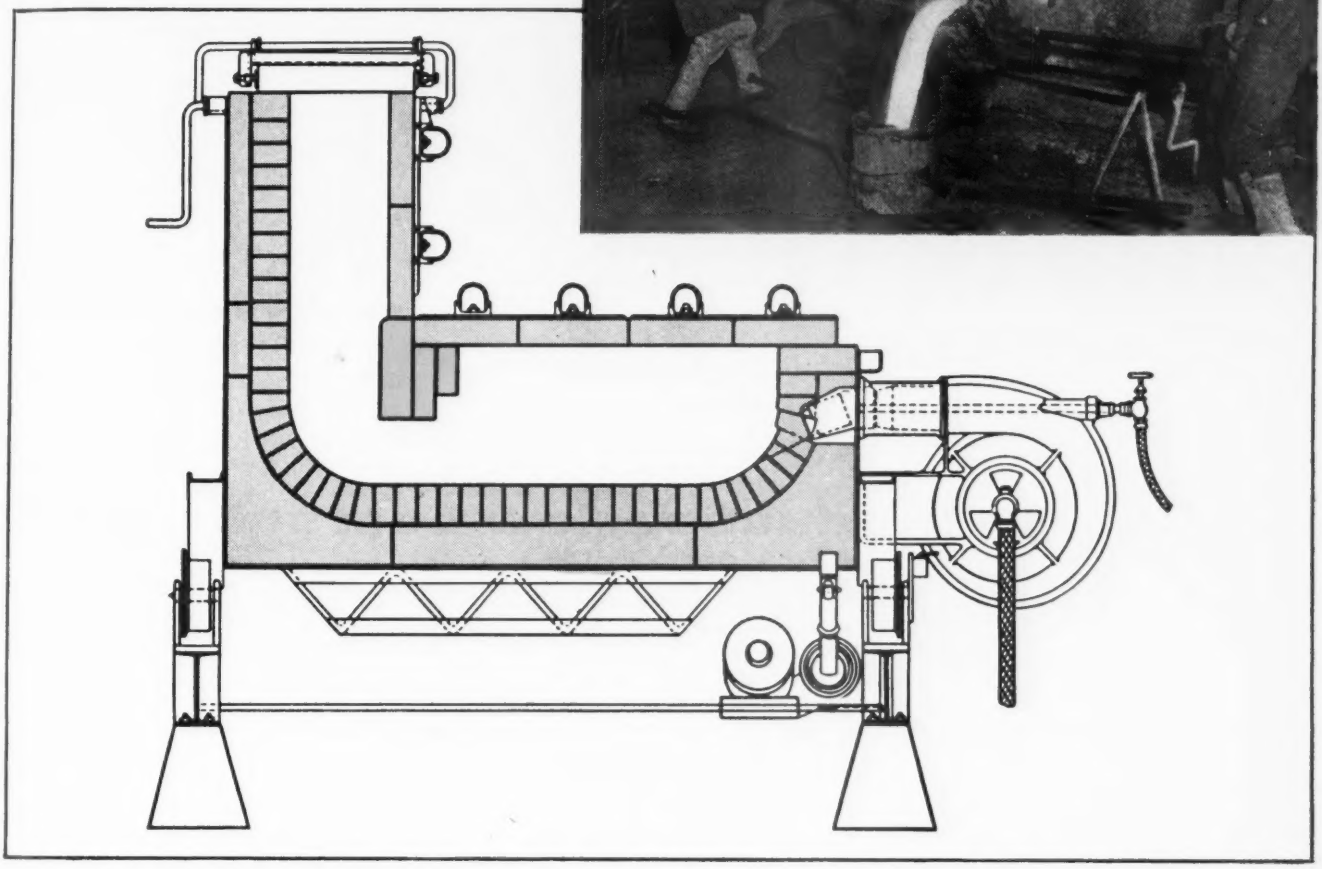
Figs. 1-10—Sketches show some of the ways metal can be collected in a pouring basin, including methods involving use of flower pots. As the sketches indicate, flower pots also can be used for other applications

Another Norton Rx *on the job!*

CRYSTOLON* baffle plates contribute to the high melting efficiency of Reda reverberatory furnaces



Reladling ductile iron from a Reda reverberatory furnace for ferrosilicon addition. These furnaces are designed for fast, low cost melting of both ferrous and non-ferrous alloys.



Cross-section of a reverberatory furnace manufactured by the Reda Pump Co. of Bartlesville, Okla. Charge is through the stack and the metal is heated by direct impingement of the flame passing over the metal bath and by reflected heat from roof and side walls. Melting takes place at base of stack, where CRYSTOLON baffle plates (shown in color) are the Norton ℞ — an expertly engineered refractory prescription — for this critical spot.

CRYSTOLON refractory material is *engineered* to combine great physical strength with exceptional resistance to thermal shock, slag penetration and chemical attack. It will withstand temperatures up to 3050°F, and has up to 15 times the resistance of ordinary fire clay to erosion and corrosion.

That is why CRYSTOLON baffle plates were *prescribed* for Reda furnaces — adding another to the long list of highly successful Norton ℞'s for the metal melting field.

Whatever your own furnace operations may be, there is a Norton ℞ that will help you to save time, labor and money. For information about Norton CRYSTOLON*, ALUNDUM*, MAGNORITE* and FUSED STABILIZED ZIRCONIA refractories — standard or special shapes or cements — see your Norton representative. Or write to NORTON COMPANY, Refractories Division, 301 New Bond Street, Worcester 6, Mass. *Canadian Representative:* A. P. Green Fire Brick Co., Ltd., Toronto 5, Ontario.

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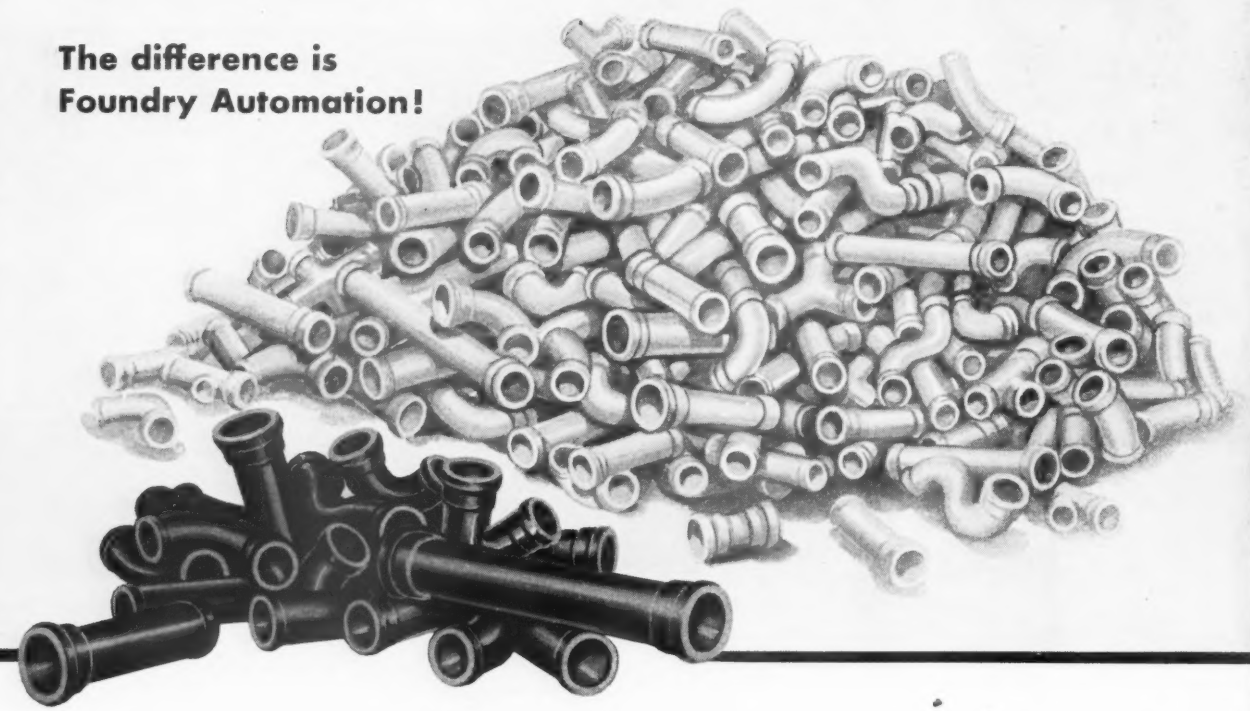

AUTOMATION

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THROUGH AUTOMATION, the Foundry Industry has made significant advances. Lower unit cost, higher production per man, and improved casting quality are among the many reasons foundries are turning to Automation. They are finding that with a well-engineered, mechanized foundry they can strengthen their competitive position, expand existing markets, and open new ones.

GIFFELS & VALLET Inc., long active in the field of Automation, maintains a Foundry Department with a large staff of engineers and technicians. These specialists are experienced in planning complete automated foundries. The interesting story of this comprehensive service is discussed in a special Foundry brochure. A copy will be mailed upon request.

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(*Continued from page* 130)

the plug melts, and the metal goes in. Since the clay pot causes very little chilling and acts as an insulator, it is of some assistance in feeding. You can, if you wish, use a stopper rod as shown in Figs. 2, 3 and 4.

Fig. 7 shows another use for our friend the old red flower pot. In this instance, it is used as an insulated riser. You can use pots for this purpose, either without bottoms or by varying the bottom hole to produce a necked-down insulated riser which easily can be broken from the casting. A cover of vermiculite or charcoal on the top after pouring gives added life to the riser. Flower pots often can be used to replace plaster or other types of sleeves.

Fig. 8 shows a small flower pot fitted into the cope as a pouring basin which under no conditions will wash when poured into. The bottom hole can be adjusted to suit metal flow and choke. A button on the squeezer bored to the size and shape of the pot desired is all you need, or a sprue of the desired shape can be rammed up.

Small Pot Prevents Erosion

In Fig. 9, we again use a small pot, this time as a splash tile in the drag to prevent erosion and wash and to provide a heel to pour against. By drilling the bottoms for suitable pencil gates, you can use the pots as combination gates and heads for slugs and bushings.

Fig. 10 illustrates a cast iron chill with a handle. The chill is machined out to take a small pot which has had its bottom sawed off. Some time back, I came across these being used to produce chill samples from red brass heats. They were split from top to bottom for a visual quality analysis to determine whether the slug would take a normal shrink or mushroom, indicating gassy metal. The user claimed that continuous use of this method and a study over a period of time gave him the story pretty well.

It had come about as a very rapid method of producing slugs without making and assembling core molds against a chill block, as when producing the ¾ x 3 by 6-in. sample. The bottom of this chill mold was 2 in. thick. It is poured and tapped out into a bucket of water when solidified. A new pot is dropped in place, and the operation repeated. Of course, all this is a good way off the question at hand, but it shows another use for flower pots in the foundry. These pots are not as

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quick to absorb moisture from molding sand as might be expected and seem to be less absorbent than most sleeve materials.

For a riser that just won't give up when it comes to staying hot, place a flower pot on the cope and position a section of pipe around it, leaving 1½ to 2 in. of space between pot and pipe. Pack this space with mica or vermiculite and cover the metal in the head with the same material.

Flower pots, or redskins, as Mom used to call them, vary somewhat in quality, and some will split or crack when used if they have not been dried properly. The trick seems to be in drying them out well and letting them cool slowly. They then should be stored in a dry, warm place for two or three weeks before use. I buried one in a bed of green sand, let it sit for several days and then poured it full of gray iron with no reaction whatsoever. It cracked up one side, but only after the iron had been fully solidified for some time.

I also tried one as a ladle liner for aluminum with gratifying results. I built a bowl just to size in which the pot fitted like a glove. The bottom of the rim on the pot can be flush with the bowl. A simple dog held it down in the back, and I plugged the center hole with clay. I still use it every so often. It prevents contamination, and I can reline it in 15 seconds.

To come back to your problem, I would, if possible, use a teapot ladle and carefully check gating and molding practice. You can spray your pouring basin with molasses water or a prepared mold spray and torch-dry it lightly. First of all, however, check your molding practice very carefully. Do the same with pouring and melting practice. I have seen many jobs such as yours poured through a combination sprue and riser with very good results. Try a slot sprue on one side of your hub and a riser, or perhaps a strainer core, on the other. The absence of a casting leaves me in the dark; however, I thought you might find some use for those old redskins the little woman has out back.

CHARLIE

Sly Convectioneered Box Oven at plant of American Crucible Products Co., Lorain, Ohio, a pioneer in the field of high lead, bronzes and babbitts and maker of Promet Bronzes.

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Abrasive Cut-Off Wheel Failure Explained

Why abrasive cut-off wheels sometimes fail is described in a new 40-page booklet issued by the Wallace Tube Co., 1300 Diversey Parkway, Chicago 14. Illustrations, tables, charts and diagrams aid in the proper selection and use of abrasive wheels. The book, "Why Do Abrasive Cut-Off Wheels Fail? (Sometimes)," is free if requested on company letterhead; otherwise it is 50 cents per copy.

Book Review

Machine Shop Operations and Setups, by H. W. Porter, C. H. Lawshe and O. D. Lascoe, cloth, 397 pages, 5½ x 8½ in., published by American Technical Society, 848 East 58th St., Chicago 37, Ill. Price $5.50.

This book is designed to meet specific requirements of modern instruction in machine shop techniques. New widely used operations are included in place of out-of-date practices. Operations and setups are accompanied by illustrations to show operations, safety measures and equipment in clear detail. Subjects covered by chapter headings are measuring tools, bench tools, drill press, engine lathe, shaper and planer, milling machines —construction, cutting tools, accessories, setups and operations, and grinding machines, surface, cylindrical and internal.

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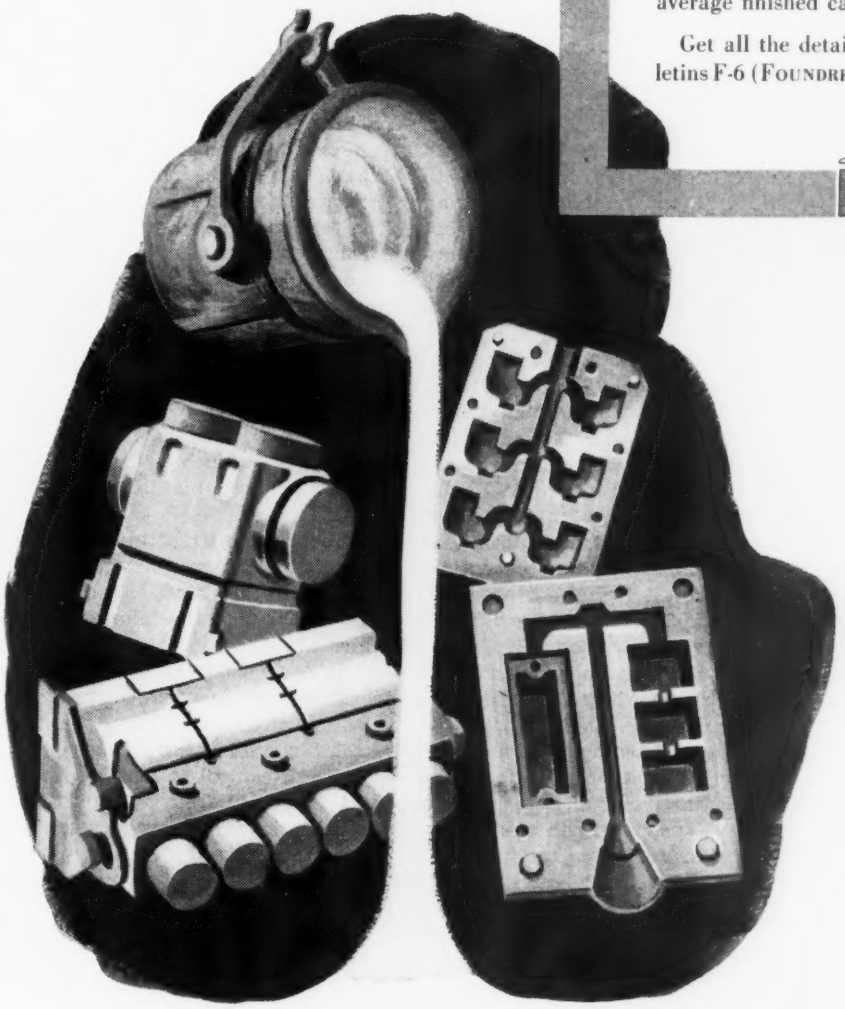
FOUNDREZ 7429 and FOUNDREZ 7581



● Now, thanks to FOUNDREZ 7429, you can get outstanding shell molds with a conventional blowing machine at a saving of 50 to 75% in resin. You cut overall shell mold production cost one half to one third with this liquid, water-soluble Reichhold phenolic resin. The shells equal or surpass the smoothness and dimensional accuracy of molds made by the "C" process, with its expensive special equipment.

Faster core blowing is the big reason for replacing core oils with RCI's other liquid, water-soluble, phenolic resin — FOUNDREZ 7581. It reduces the coring cycle from hours to minutes. Cores come out almost "pattern-smooth", making hand filing, mudding or core washing generally unnecessary. As the binder contains no cereal, there's less gassing and fewer rejects. Thus, FOUNDREZ 7581 saves you labor, which makes up about 35 to 40% of the total cost of the average finished casting.

Get all the details. Write for free Technical Bulletins F-6 (FOUNDREZ 7429) and F-5 (FOUNDREZ 7581).

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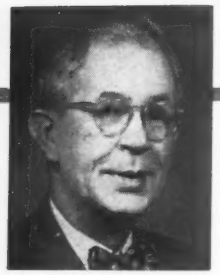

MAN-TO-MAN

By RALPH L. LEE

The Art of Listening and Leadership

"All of my topnotch leaders listen to the other fellow with minds cleared and open, expecting to hear something important from him"

WORKING alone up there in the Lee Hobby Foundry isn't as lonesome at times as a person would suspect. No matter what I'm doing, I frequently feel old bosses peeping over my shoulder. Almost every move I make recalls some lesson taught me in the past, some bit of advice—a caution, but mostly suggestions, encouragement and, yes, a darned good bawling out now and then!

The other night, after almost a parade of old bosses had drifted by, it dawned on me how lucky I have been all my life. With very few exceptions I have worked under the leadership of fine men (not fine just because they were mine) who didn't pamper me, but wished me well and, I feel quite sure, took a certain amount of personal pride in my learning and progress.

Having followed good leaders is no doubt responsible for my appreciation of their strategic importance to an organization and of the mess an outfit can get into without them. Believing the old saw that an organization is usually the lengthened shadow of its leaders, I set about many years ago trying to find out what it was leaders had that those who couldn't lead did not have.

For quite a spell I practically made a career of listing the personal traits and peculiarities I had found in common in the leaders I had followed and had really learned to know. I wrote volumes about this list and lectured about it to industrial and educational groups all over the country.

I started out with some 68 items, I believe, each of which was easily recognizable in a suspected leader. In fact, I rigged up sort of a leadership appraisal quiz which worked surprisingly well. Then in an effort to speed up the use of the quiz, I began boiling down the list, finding many of the items were different telltales of the same basic characteristics.

With many invitations to speak on the subject and a set time to do it in, I finally got the list down to 14 items, still keeping the 68, however, for actual work with specific organizations.

Looking back over this shrinking process, I couldn't help thinking of what I would do if in some between-the-train or plane emergency I had to cut my list of leadership traits to one item. Which of the 68 or 14 would I choose? I didn't have to wrestle with this problem very long to discover one outstanding trait that was common to every single, topnotch leader I had followed or really learned to know. Every one of them *listened* more than he *talked*.

At first when I scanned my list to check this point, I thought for a moment that several notable exceptions might disprove the rule. One individual who is recognized as an international leader in his field talks as much as or more than I do. Upon further thought it turned out that this fellow and the other exceptions were leaders all right, but of a different kind. These were evangelists who gathered prospective followers into flocks, but who wouldn't last very long shepherding the same flock day after day.

So I chose listening as the key to leadership, in spite of the fact that I am instinctively a natural born chatterbox, spewing forth at the drop of a hat, far too often talking when I shouldn't and much longer than I should. This antileadership trait of mine probably explains why I work alone in the Lee Hobby Foundry—that is, when I'm not shooting off the old mouth at some meeting.

From what I've been able to find out, leadership listening means a whole lot more than just keeping the old trap shut. To me, it means clearing your mind of what you are going to say the instant the other fellow stops for breath. It means clearing your mind of what you are going to do when the other fellow gets the heck out of there. No one, even a mental giant, can think of two things at the same instant, such as WHAT HE'S SAYING and WHAT I'M GOING TO SAY OR DO.

I've been told that the mind is like the macula of the eye (one tiny portion of the retina capable of sharply focused looking). The mind can concentrate on only one thought at a time. Although in a pinch it can hop and skip from thought to thought, it can not straddle.

If this is true, any individual who sits at his desk signing letters or shuffling papers while telling his caller, "Go right ahead, I'm listening," is telling an unadulterated fib. It can't be done, and even if it could it would be an insult to the other fellow.

I don't think there has been enough masterful listening in our foundries, shops and factories. It might well be that in some cases followers have been forced to hire professional listeners to hear them out.

No, sir! Now that I think of it, all of my topnotch leaders listen to the other fellow with their minds cleared and open, expecting something important, dead set on getting the nub of what he's driving at, no matter how much he hums and haws or how short his list of words to pick from.

There is no doubt in my mind that it takes a lot of courage (intestinal fortitude) to listen like a leader, to say nothing of the following requirements:

1. A noncompetitive attitude
2. Self-confidence (honestly earned)
3. Sincere interest
4. Self-control (a must)
5. Freedom from self-consciousness
6. Patience (in every sense of the word, and lots of it).

I certainly wouldn't encourage anyone to believe that all he has to do to become a leader is to shut his big mouth. There are some fine and useful folks who just won't talk, even when they should, because they lack the minimum leadership talent or inclination.

Since the art of listening goes hand in hand with effective leadership (at least in my book) and since there are folks locked in jobs requiring leadership who talk too much for their own good and everybody

(*Concluded on page* 138)

Intricate Castings Like this call for Neville Pig Iron

TRACTOR transmission castings like the one shown above have to stand up to years of rugged service. That's why the Lynchburg Foundry Company, Lynchburg, Va., insists upon malleable pig iron that meets rigid specifications for uniform composition and high quality. To meet these requirements, Lynchburg uses *Neville* Pig Iron to cast transmission cases, flywheels, crankcases, oil pans, brake drums and other cast products. ● If your casting requirements are strict, it will pay you to specify *Neville* Pig Iron. Write, wire or phone for more facts today.

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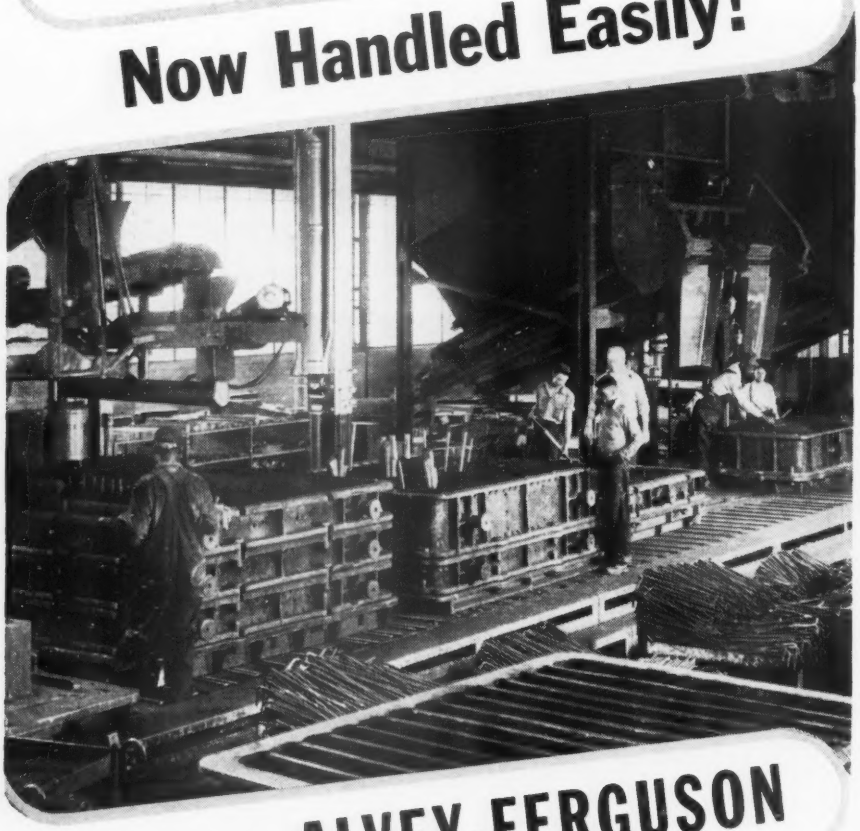
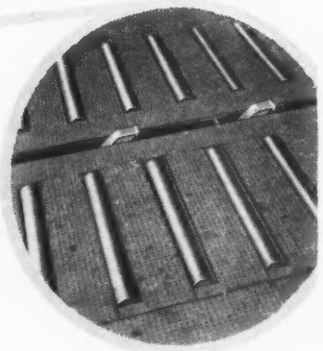


with an ALVEY-FERGUSON Engineered Conveying System



IN THIS modern foundry, heavy molds weighing from 15,000 to 20,000 lbs. are handled easily on an Alvey-Ferguson Heavy Duty Roller Conveying System with an air operated reciprocating pusher between the two lines of rollers. (See inset photo)

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(*Concluded from page* 136)

else's, here are some questions about why people talk too much, the answers to which might very well be helpful:

1. Could it be that the talker is so thoroughly convinced that his aims are so important, his experiences so extraordinary, his ideas so good and his conclusions so profound that anyone within reach of his voice would do well to listen?

2. Could it be that he gets such a bang out of his own activities it never occurs to him that there may be others like him?

3. Could he by sheer joy of exercising his vocal chords (like the little bird) cut loose with no thought of the reactions of the other fellow?

4. Is he so self-conscious in the presence of others that he hysterically runs off at the mouth (like biting the nails, tapping his feet or cracking knuckles)?

5. Could he find his ability so short in comparison with that of his associates that he tries to hide the fact by a smoke screen of chatter?

6. Is he under the impression that by interrupting others or drowning them out, he can prevent them from overshadowing him as he knows he deserves?

7. Could it be that he believes that by starting an argument, forwarding it and winning it he can hide his own shortcomings in the turmoil?

8. Could it be that, underrating the intelligence, ability, worth and sincerity of the average person he meets, he sees little to be gained from listening?

9. Is he just a clown, wanting attention, whether favorable or not?

I think we will find that these nine symptoms of chronic talkativeness all come home to roost on an inordinate concern with self to a point of blinding the sufferer as to his ultimate dependence upon others, their rights, their welfare and interests. After all, a real leader must work through others with his hands behind his back.

Any good thing can be carried too far, of course. As we all know, there definitely is a place and time for talk. And I imagine there are some whose careers suffer from their lack of ability to talk effectively. All power to the courses in public speaking aimed in this direction. If, on the other hand, we had to choose between a course in the art of speaking and the art of listening, I believe I'd pick the latter at least to begin with—that is, if I had an ambition to become a leader or a better one. Outstanding speakers are usually darned good listeners too. That's the way they get most of their dope, I imagine.

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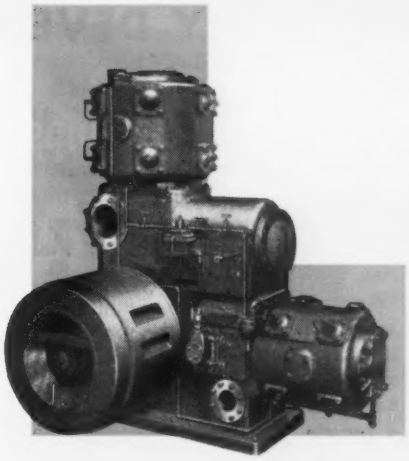

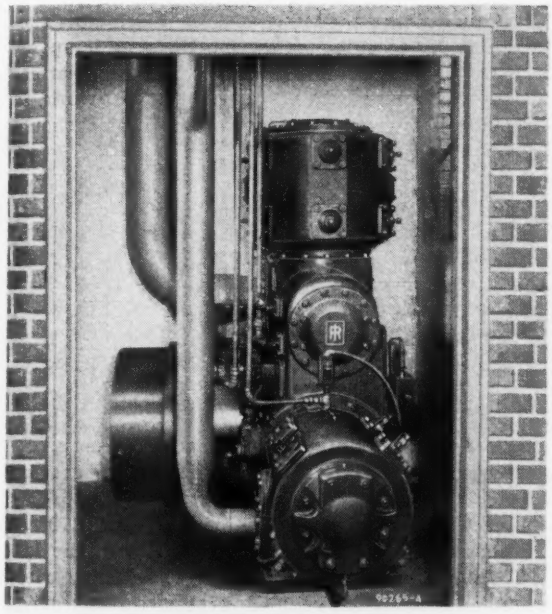

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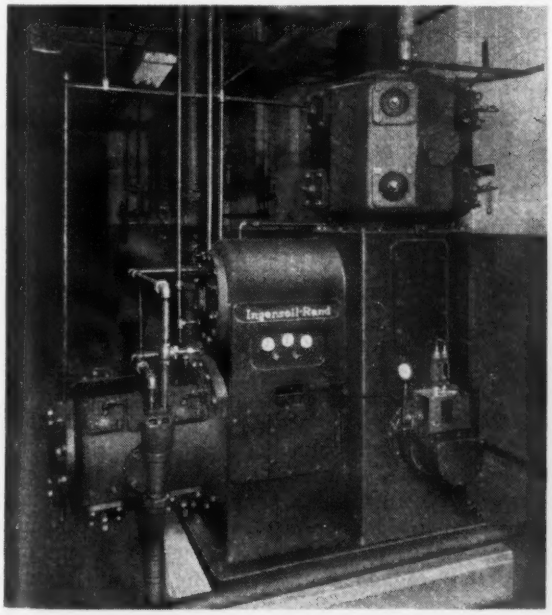
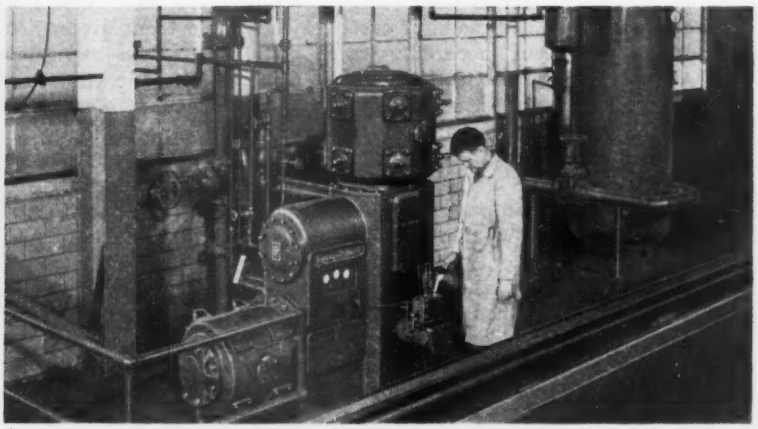


A safety-razor manufacturer found plenty of space for this XLE installation in a screened-off basement corner.



And here's a compact, space-saving installation of an XLE compressor, aftercooler and air receiver in a tool plant

FOUNDRY DEVELOPMENTS

By EDWIN BREMER
Metallurgical Editor

NEW type of alloy steel with high resistance to impact and abrasion has been developed by American Steel Foundries, East Chicago, Ind. Known as "Wearpact" the steel has been subjected to intensive field testing in taconite, hematite and copper mining operations. It has a high initial hardness of 470 to 520 brinell, with a tensile strength exceeding 220,000 psi and a yield strength of 180,000 psi. The material can be welded by conventional arc-welding methods, hardness being affected only in immediate area of the weld. It is machinable using heavy-duty equipment, or it can be finished by grinding. Initial hardness is retained in sections up to 6 in. thick with only a slight reduction in hardness of thicker sections.

* * *

ENGINEERS now can estimate the effect of the addition of new equipment to an industrial operation without actually test-installing it, according to *Industrial Research Newsletter* published by Armour Research Foundation. An electronic testing system developed by Minneapolis Regulator Co. translates behavior characteristics to a chart record which is analyzed to determine how a component will affect the over-all behavior of the operation.

* * *

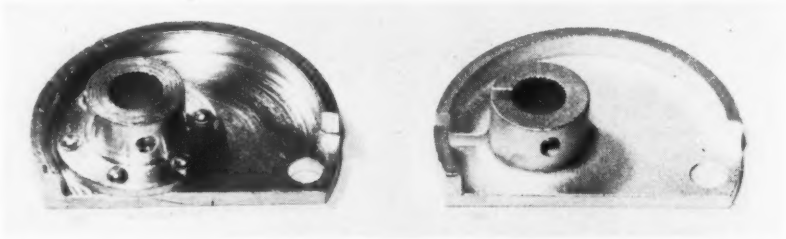
SOAKING pits in the wrought steel industry in which ingots are raised to temperatures from 2150 to 2450° F for reduction by rolling or forging, expose construction materials to high temperatures and temperature cycling. In addition, the materials are subject to corrosive gases for long periods of time. To withstand those conditions, parts such as soaking pit cover seals and flue dampers are frequently made of cast high-alloy type steel, according to the Alloy Casting Institute, New York. The alloy steel designated type HH by the institute contains 24 to 28 per cent chromium and 11 to 14 per cent nickel, has high strength, ductility and corrosion resistance at temperatures up to 2000° F.

* * *

FOR MANY years the National Bureau of Standards has sought the reasons why certain metal parts failed in service. Recently the bureau published NBS circular 550 entitled "Mechanical Failures of Metals in Service." It contains 35 such cases, representing the commonest types of failures. These are described, and the factors of design, fabrication or use contributing to the failures are presented. How to recognize the various types of fractures is discussed, and ways to reduce mechanical failures of metals in service are given. The circular may be obtained for 30 cents from the U. S. Government Printing Office, Washington 25.

* * *

REDUCED production costs of approximately 86 per cent have been obtained in the production of the valve cam shown in the accompanying illustration by Stratos Division, Fairchild Engine & Airplane Co., New York. Cam originally was formed from a two-piece assembly as shown at the left. Now it is made in one piece by the investment casting process performed by National Precision Casting Corp., Clifton Heights, Pa. The one-piece cam is cast to shape in 4140 steel, with cam area hardened to Rc 50. In the former two-piece assembly the main segment of 4140 steel was turned from bar stock and hardened. Hub was brass turned from bar stock and broached and then the two pieces were riveted together.



One-piece casting shown at the right and made by the investment molding process replaces two-piece assembly at left at considerably lower cost

* * *

PRACTICAL way to minimize objectionable transformer noise at field installations has been developed by General Electric Co. engineers at Pittsfield, Mass. Method involves use of sound cancellation which consists in sending out another sound wave having two sounds of the same frequency but of opposite phase. Sound waves tend to cancel each other and cause a "cone of silence" within a localized zone. With the transformer the added sound is supplied by a loudspeaker mounted on the tank and beamed in the proper direction. However, sound cancellation is not the cure-all for transformer noise because cancelling out the sound in one direction tends to increase the level in another direction. Also there are limits to the distance and area where sound cancellation occurs with any type of such equipment.

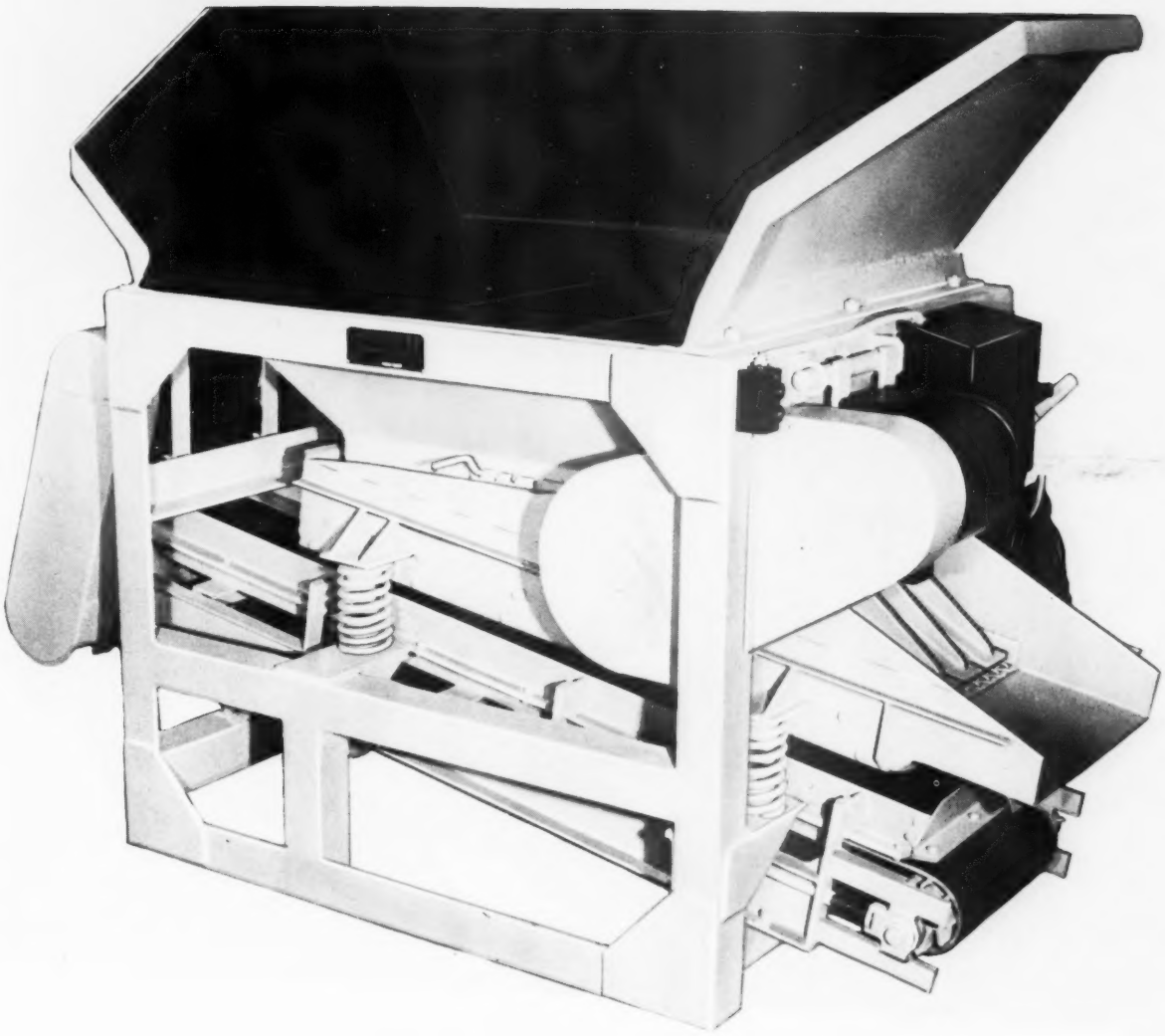
* * *

SUITABLE material for making duplicate patterns is an alloy containing 55.5 per cent bismuth and 44.5 per cent lead. Available under the trade name "Cerrobase," it has a melting temperature of 225° F, and is said to cast well in sand, plaster and even in wood without discoloring or charring. The alloy does not shrink when risered properly; actually it expands slightly after cooling to room temperature. For successful application, pouring temperature should be determined thermometrically. For long, thin work, a pouring temperature of 310° F should be used; a temperature of 270° is best for thick solid work. In the latter type of castings a heavy riser should be placed opposite the point of entry of metal into the cavity to insure feeding.

* * *

NEW alloys based on such elements as vanadium, chromium, rhenium and silicon will appear on the industrial horizon within a few years, according to Robert A. Lubker, manager of the metals research department, Armour Research Foundation, Illinois Institute of Technology, Chicago. Vanadium-base alloys with a density of about 6 may provide a long-range answer to the problem of improved elevated temperature alloys for aircraft frames. In the meantime, Lubker expects continuing progress in broadening the application of more familiar metallurgical materials such as aluminum alloys and steels, based on increased supplies of the metals and over-all expansion of the nation's industrial picture. Metallurgists are developing new titanium alloys designed to give improvement in strength at elevated temperatures combined with relatively low density.

FLOOR MOUNTED... *no pits required for the* NEW "60" PREPARATOR

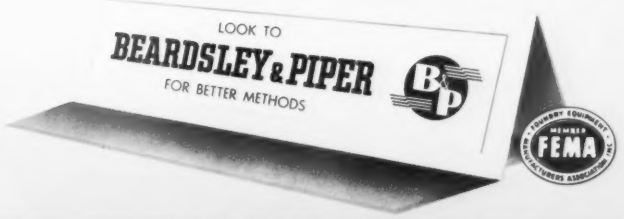


NEW MACHINE DESIGNED FOR USE WITH ANY FRONT-END LOADER

The new "60" Preparator—designed for use in B&P Speedmullor-Preparator Units—completely conditions up to 40 tons of molding sand per hour, and can be installed without pits of any kind. This one "most needed" feature would make the new "60" Preparator big news, but look at the other new features:

1. 50% greater loading hopper capacity—no waiting to load.
2. Flush-sided construction permits easy loading.
3. Loading height only 4'-2"—low enough for any loader —no ramps required.
4. Permanent magnet separation—no tubes, no rectifiers.
5. High-capacity high-frequency screening—new performance records.
6. New lump breaker—more effective handling of lumps.
7. Also available in a portable model.

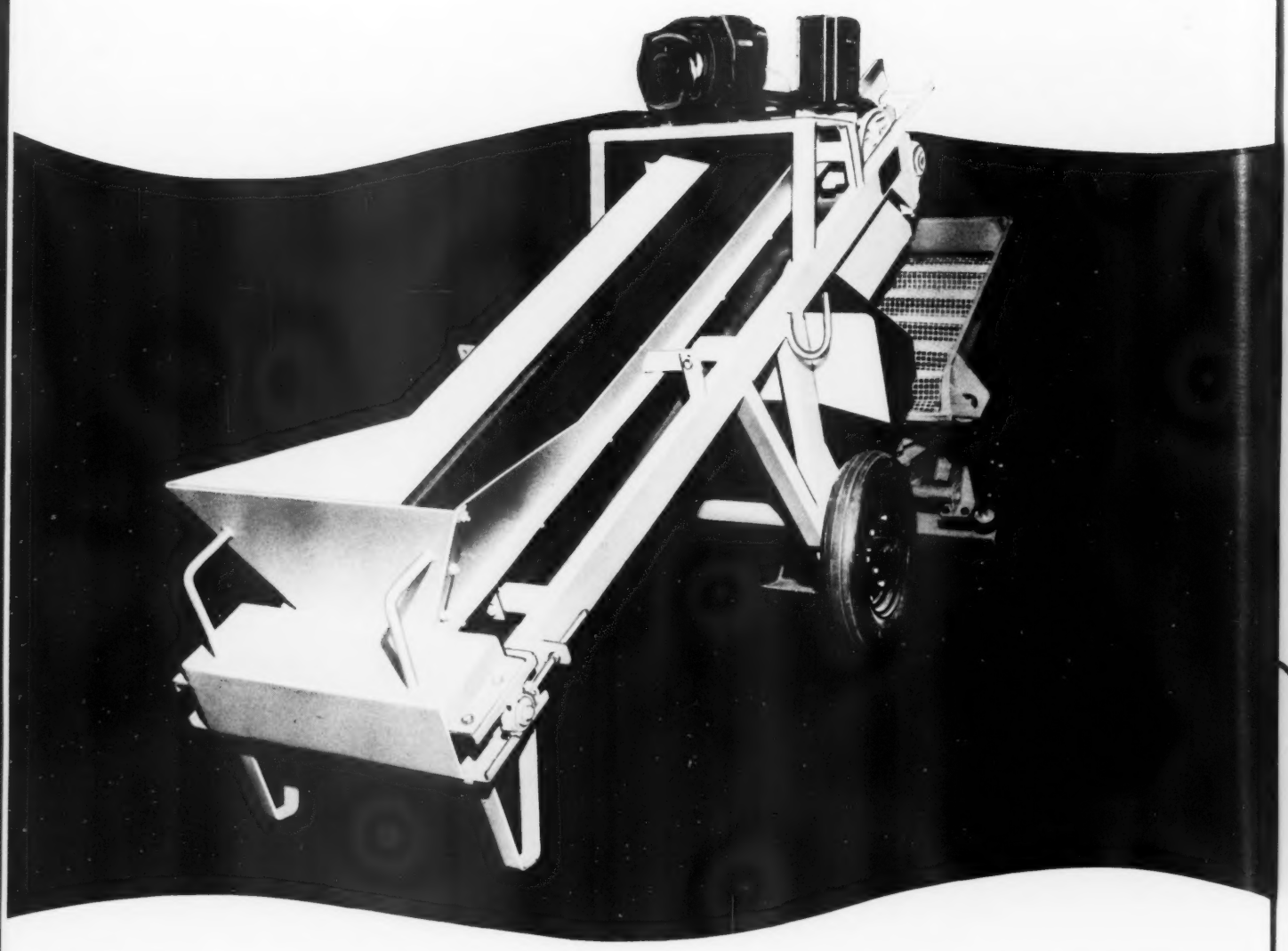
For rugged construction and dependable performance, it's the new "60" Preparator. Write now for full data . . . *Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Avenue, Chicago 39, Illinois.*



HERE'S THE NEW PORTABLE

MAGNAVEYOR

to improve your casting surface



The Magnaveyor is a sturdy new belt loading unit with a dependable permanent magnet separator, built by Beardsley & Piper to meet a definite need for better foundry sand preparation.

The Magnaveyor loads a B&P Screenarator, or other conditioner, at a rate of up to 1500 pounds per minute, and completely separates iron scrap, shot, and wires and nails from the sand being loaded. It is highly portable and may be easily moved by one man from foundry floor to floor. It is easily and quickly placed in operation with a Screenarator, or other device, and appreciably increases the efficiency of the conditioning unit with which it works.

A small knee-high hopper for shovel-loading makes the Magnaveyor particularly convenient for side floor sand preparation. Once you try it your molders will never want to do without it. Write now for information. *Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Avenue, Chicago 39, Illinois.*

LOOK TO
BEARDSLEY & PIPER
FOR BETTER METHODS

B&P

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION
MEMBER
FEMA

Weights of Rods or Cylinder per Running Inch

Following tables give weights in lb of rods or cylinders of different materials, 1 in. long. To find weight of a cylinder of any length multiply the weight per running inch obtained from the tables by the length.

To find the weight of a tube of any length, subtract the weight per running inch corresponding to the inside diameter from the weight per running inch corresponding to the outside diameter, and then multiply this result by the length. This product is the weight required.

Weight of Rod or Cylinder 1 Inch Long When Cast in

Dia. in inches	Cast iron	Steel	Aluminum	Copper	Zinc	Gun metal	Yellow brass
⅛	.0032	.0035	.0012	.0034	.0031	.0039	.0037
¼	.0123	.0139	.0047	.0132	.0124	.0155	.0148
⅜	.0288	.0313	.0106	.0353	.0279	.0348	.0334
½	.0511	.0556	.0189	.0627	.0496	.0619	.0594
⅝	.0799	.0869	.0295	.0980	.0775	.0967	.0928
¾	.115	.125	.0425	.141	.112	.139	.134
⅞	.157	.170	.0579	.192	.152	.190	.182
1	.204	.223	.0756	.251	.198	.248	.238
1⅛	.259	.282	.0957	.318	.251	.313	.301
1¼	.320	.348	.118	.392	.310	.337	.371
1⅜	.387	.421	.148	.474	.375	.468	.449
1½	.460	.501	.170	.565	.446	.557	.535
1⅝	.540	.588	.200	.663	.524	.654	.627
1¾	.626	.681	.232	.769	.607	.758	.728
1⅞	.719	.782	.266	.882	.697	.871	.835
2	.818	.890	.303	1.00	.793	.990	.950
2⅛	.924	1.01	.342	1.13	.895	1.11	1.07
2¼	1.04	1.13	.383	1.27	1.00	1.25	1.20
2⅜	1.15	1.26	.427	1.42	1.12	1.40	1.34
2½	1.28	1.39	.473	1.57	1.24	1.55	1.48
2⅝	1.41	1.54	.521	1.73	1.37	1.71	1.64
2¾	1.55	1.69	.572	1.90	1.50	1.87	1.80
2⅞	1.69	1.84	.625	2.07	1.64	2.04	1.96
3	1.84	2.01	.681	2.26	1.78	2.23	2.14
3⅛	2.00	2.18	.739	2.45	1.94	2.42	2.32
3¼	2.16	2.35	.799	2.65	2.09	2.61	2.51
3⅜	2.33	2.53	.862	2.86	2 26	2.82	2.71
3½	2.51	2.73	.927	3.07	2.43	3.03	2.91
3⅝	2.69	2.92	.994	3.30	2.61	3.25	3.12
3¾	2.88	3.13	1.06	3.53	2.79	3.48	3.34
3⅞	3.07	3.34	1.14	3.77	2.97	3.72	3.57
4	3.27	3.57	1.21	4.01	3.17	3.96	3.80
4⅛	3.48	3.79	1.29	4.27	3 37	4.21	4.04
4¼	3.69	4.02	1.37	4.53	3.58	4.47	4.29
4⅜	3.91	4.26	1.45	4.80	3.80	4.74	4.55
4½	4.14	4 51	1.53	5.08	4.02	5.01	4.81
4⅝	4.37	4.76	1.62	5.37	4.24	5.30	5.08
4¾	4.61	5.02	1.71	5.66	4.47	5.59	5.36
4⅞	4.86	5.29	1.80	5.96	4.71	5.88	5.65

Weight of Rod or Cylinder 1 Inch Long When Cast in

Dia. in inches	Cast iron	Steel	Aluminum	Copper	Zinc	Gun metal	Yellow brass
5	5.11	5.56	1.89	6.27	4.96	6.19	5.94
5⅛	5.37	5.84	1.99	6 59	5.21	6.50	6.24
5¼	5 64	6.13	2.08	6.92	5.47	6.83	6.55
5⅜	5.91	6.43	2.19	7.25	5.73	7.15	6.86
5½	6.19	6.73	2.29	7.59	6.00	7.49	7.19
5⅝	6.47	7.04	2.39	7.94	6.27	7.83	7.52
5¾	6.76	7.36	2.50	8.30	6.56	8.19	7.85
5⅞	7.06	7.68	2.61	8.66	6.84	8.54	8.20
6	7 36	8.01	2.72	9.03	7.14	8.91	8.55
6⅛	7.67	8.35	2.83	9.41	7.44	9.28	8.91
6¼	7.99	8.69	2.95	9.80	7.75	9.67	9.28
6⅜	8.31	9.04	3.07	10.20	8.06	10 06	9.65
6½	8.64	9.40	3.20	10.60	8.38	10.46	10.04
6⅝	8.98	9.77	3.32	11.01	8.70	10.86	10.43
6¾	9 32	10.14	3.45	11.43	9.04	11.28	10.82
6⅞	9.67	10.52	3.57	11.86	9.37	11.70	11.23
7	10.02	10.90	3.71	12.30	9.72	12.13	11.64
7⅛	10.33	11.30	3.84	12.74	10.07	12.57	12.06
7¼	10.75	11.70	3.98	13.19	10.42	13.01	12.49
7⅜	11.12	12.10	4.11	13.65	10.79	13.47	12.92
7½	11.50	12.52	4.25	14.11	11.16	13.92	13.36
7⅝	11.89	12.94	4.40	14.59	11.53	14.39	13.81
7¾	12.28	13.36	4.54	15.07	11.91	14.87	14.27
7⅞	12.68	13.80	4.69	15.56	12.30	15.35	14.73
8	13.09	14.24	4.84	16.06	12.69	15.84	15.20
8⅛	13.50	14.69	4.99	16.57	13.09	16.35	15.68
8¼	13 92	15.14	5.15	17.08	13.50	16.85	16.17
8⅜	14.34	15.61	5.30	17.60	13.91	17.36	16.66
8½	14.78	16.08	5.47	18.13	14.33	17.89	17.17
8⅝	15.21	16.55	5.63	18.67	14.75	18 42	17.67
8¾	15.66	17.04	5.79	19.21	15.18	18.95	18.19
8⅞	16.11	17.53	5.96	19.77	15.62	19.50	18.71
9	16 57	18.02	6.13	20.33	16.06	20.06	19.24
9⅛	17.03	18.53	6.30	20.89	16.51	20.61	19.78
9¼	17.50	19.04	6.47	21.47	16.97	21.18	20.33
9⅜	17.98	19.56	6.65	22.05	17.43	21.76	20.88
9½	18.46	20.08	6.83	22.65	17.90	22.35	21.44
9⅝	18.95	20.61	7.01	23.25	18.37	22.94	22.01
9¾	19 44	21.15	7.19	23.85	18.85	23.53	22.59
9⅞	19.94	21.70	7.38	24.47	19.34	24.14	23.17

Weight of Rod or Cylinder 1 Inch Long When Cast in

Dia. in inches	Cast iron	Steel	Aluminum	Copper	Zinc	Gun metal	Yellow brass
10	20.45	22.25	7.56	25.09	19.83	24.77	23.76
10⅛	20.97	22 81	7.75	25.72	20.33	25.38	24.36
10¼	21.49	23.38	7.95	26.36	20.84	26.01	24.96
10⅜	22.01	23.95	8.14	27.01	21.35	26.65	25.57
10½	22.55	24.53	8.34	27.67	21 86	27.28	26.19
10⅝	23.09	25.12	8.54	28.33	22.39	27.94	26.82
10¾	23.63	25.71	8.74	29.00	22.92	28.61	27.46
10⅞	24.19	26.32	8.95	29.68	23.45	29.28	28.10
11	24.75	26.92	9.15	30.36	24.00	29.96	28.75
11⅛	25.31	27.54	9.36	31.06	24.54	30.64	29.40
11¼	25.88	28.16	9.57	31.76	25 09	31.34	30.07
11⅜	26.46	23.79	9.79	32.47	25.66	32.04	30.74
11½	27.05	29.43	10.00	33.19	26.23	32.75	31.42
11⅝	27.64	30 07	10.22	33.91	26.80	33.46	32.11
11¾	28.24	30.72	10.44	34.64	27.38	34.18	32.80
11⅞	28.84	31.38	10.67	35.39	27.97	34.92	33.50
12	29 45	32.04	10.89	36.13	28.56	35.65	34.21
12⅛	30.07	32.71	11.12	36.89	29.16	36.40	34.93
12¼	30.69	33.39	11.35	37.66	29.76	37.16	35.65
12⅜	31.32	34.08	11.58	38.43	30.37	37 92	36.38
12½	31.96	34.77	11.82	33.21	30.99	38.69	37.12
12⅝	32.60	35.47	12.06	40.00	31.61	39.47	37.87
12¾	33.25	36 17	12.30	40.79	32.24	40.25	38.62
12⅞	33.90	36.88	12.54	41.60	32.87	41.04	39.38
13	34.56	37.60	12.78	42.41	33.51	41.84	40.15
13⅛	35.23	33.33	13.03	43.23	34.16	42 65	40.93
13¼	35.91	39.06	13.28	44.05	34.82	43.46	41.71
13⅜	36.59	39.80	13 53	44.89	35.48	44.30	42.50
13½	37 27	40.55	13.78	45.73	36.14	45.12	43.30
13⅝	37.97	41.31	14.04	46.58	36.82	45.96	44.10
13¾	38.67	42.07	14.30	47.44	37.49	46.81	44.92
13⅞	39.37	42.84	14.56	48.31	38.18	47.67	45.74

Weight of Rod or Cylinder 1 Inch Long When Cast in

Dia. in inches	Cast iron	Steel	Aluminum	Copper	Zinc	Gun metal	Yellow brass
14	40.09	43.62	14.82	49.18	38.87	48.53	46.57
14⅛	40.80	44.39	15.09	50.07	39.57	49.40	47.40
14¼	41 53	45.18	15.36	50.96	40.27	50.28	48.24
14⅜	42.26	45.98	15.63	51.85	40.98	51.16	49.09
14½	43.00	46.78	15.90	52.76	41.70	52.06	49.95
14⅝	43.74	47.59	16.18	53.67	42.42	52 96	50.82
14¾	44.50	48.41	16.46	54.59	43.15	53.86	51.69
14⅞	45.25	49.23	16.74	55.52	43.88	54.78	52.57
15	46 02	50.06	17.02	56.46	44.62	55.71	53.46
15¼	47.56	51.75	17.59	58.36	46.12	57.58	55.25
15½	49.14	53.46	18.17	60.29	47.64	59.49	57.08
15¾	50.73	55.20	18.76	62.25	49.19	61.41	58.94
16	52.36	56.96	19.36	64.24	50.76	63.37	60.82
16¼	54.01	58.76	19.97	66.26	52.36	65.38	62.78
16½	55 68	60.58	20.59	68.32	54.00	67.41	64.64
16¾	57.38	62.43	21.22	70.40	55.64	69.46	66.66
17	59.11	64.30	21.86	72.52	57.31	71.55	68.66
17¼	60.86	66.21	22.51	74.67	59.01	73.68	70.70
17½	62.63	68.14	23.16	76.85	60.73	75.83	72.76
17¾	64.44	70.10	23.83	79.06	62.48	78.01	74.85
18	66 26	72.09	24.51	81.30	64.25	80.22	76.98
18¼	68.12	74.11	25.19	83.58	65.05	82.47	79.13
18½	70.00	76.15	25.89	85.88	67.87	84.74	81.31
18¾	71.90	78.22	26.59	88.22	69.72	87.05	83.53
19	73.83	80.32	27.30	90.59	71.59	89.38	85.77
19¼	75.79	82.45	28.03	92.99	73.49	91.75	88.04
19½	77.27	84.61	28.76	95.42	75.41	94.15	90.34
19¾	79.77	86.79	29.50	97.88	77.36	96.58	92.67
20	81.81	89.00	30.25	100.4	79.33	99.03	95.03
20¼	83.87	91.24	31.02	102.9	81.32	101.7	97.42
20½	85.95	93.51	31.79	105.5	83.34	104.1	99.85
20¾	88.06	95.80	32.57	108.1	85.39	106.6	102.3

The weight per running inch for diameter with a fraction such as 17⅛ can be found by interpolation as follows:

Add the product of the fractional part of the diameter multiplied by the difference between the weights in table corresponding to the next fractional inch above or below the given diameter to the weight corresponding to the next fractional inch under, the result being the required weight per running inch: Thus for cast iron ring 17⅛ diameter, from table 17¼ = 60.86; 17½ = 62.63; 62.63 − 60.86 = 1.77; 1.77 × ½ = .89; 60.86 + .89 = 61.75, weight per running inch for 17⅛ diameter.

Weight of Rods or Cylinders per Running Inch

Following tables give weights in lb of rods or cylinders of different materials, 1 in. long. To find weight of a cylinder of any length multiply the weight per running inch obtained from the tables by the length.

To find the weight of a tube of any length, subtract the weight per running inch corresponding to the inside diameter from the weight per running inch corresponding to the outside diameter, and then multiply this result by the length. This product is the weight required.

Dia. in inches	Weight of Rod or Cylinder 1 Inch Long When Cast in: Cast iron	Steel	Aluminum	Copper	Zinc	Gun metal	Yellow brass
21	90 19	98.13	33.36	110.7	87.46	109.2	104.8
21¼	92.35	100.5	34.15	113.3	89.55	111.8	107.3
21½	94.54	102.9	34.96	116.0	91.67	114.4	109.8
21¾	96.75	105.3	35.78	118.7	93.82	117.1	112.4
22	98.99	107.7	36.61	121.5	95.98	119.8	115.0
22¼	101.2	110.2	37.45	124.2	98.18	122.5	117.6
22½	103 5	112 6	38.29	127.0	100.4	125.3	120.3
22¾	105.9	115 2	39.15	129.9	102.6	128.2	123.0
23	108.2	117.7	40.01	132.7	104.9	130.9	125.7
23¼	110.6	120.3	40.89	135.6	107.2	133 8	128.4
23½	112.9	122.9	41.77	138.5	109.5	136.6	131.2
23¾	115.4	125.5	42.67	141.5	111.9	139.6	134.0
24	117 8	123.2	43.57	144.5	114 2	142.6	136.9
24¼	120.3	130.9	44.48	147.5	116 6	145.5	139.7
24½	122.8	133.6	45.40	150 6	119.0	148.6	142.6
24¾	125.3	136.3	46.33	153.7	121.5	151 6	145.5
25	127.8	139.1	47.27	156.8	124.0	154.7	148.5
25¼	130.4	141.9	48.22	160.0	126.4	157.8	151.5
25½	133 0	144.7	49.18	163.0	129.0	160.9	154.5
25¾	135.6	147.5	50.15	166.4	131.5	164.2	157.5
26	138.3	150 4	51.13	169.6	134.1	167.3	160.6
26¼	140.9	153 3	52.12	172.9	136.7	170 6	163.7
26½	143 6	156 3	53.12	176.2	139.3	173.8	166.8
26¾	146.3	159.2	54.12	179.6	141.9	177.2	170.0
27	149 1	162.2	55.14	183.0	144.6	180.5	173.2
27¼	151.9	165.2	56.17	186.4	147.3	183 9	176.4
27½	154.7	168.3	57.20	189.8	150.0	187.3	180.0
27¾	157.5	171.3	58.25	193.2	152.7	190.6	182.9
28	160 3	174.4	59.30	196.7	155.5	194.1	186.3
28¼	163.2	177.6	60.36	200.3	158.3	197.3	189.6
28½	166 1	180.7	61.44	203.8	161.1	201.1	193.0
28¾	169.0	183.9	62.52	207.4	163 9	204.7	196.4
29	172.0	187.1	63.61	211.0	166.8	208.2	199.8
29¼	175.0	190.4	64.71	214.7	169.7	211 8	203.3
29½	178.0	193 6	65.82	218.3	172.6	215.4	206.7
29¾	181.0	196.9	66.94	222.1	175.5	219.1	210.3

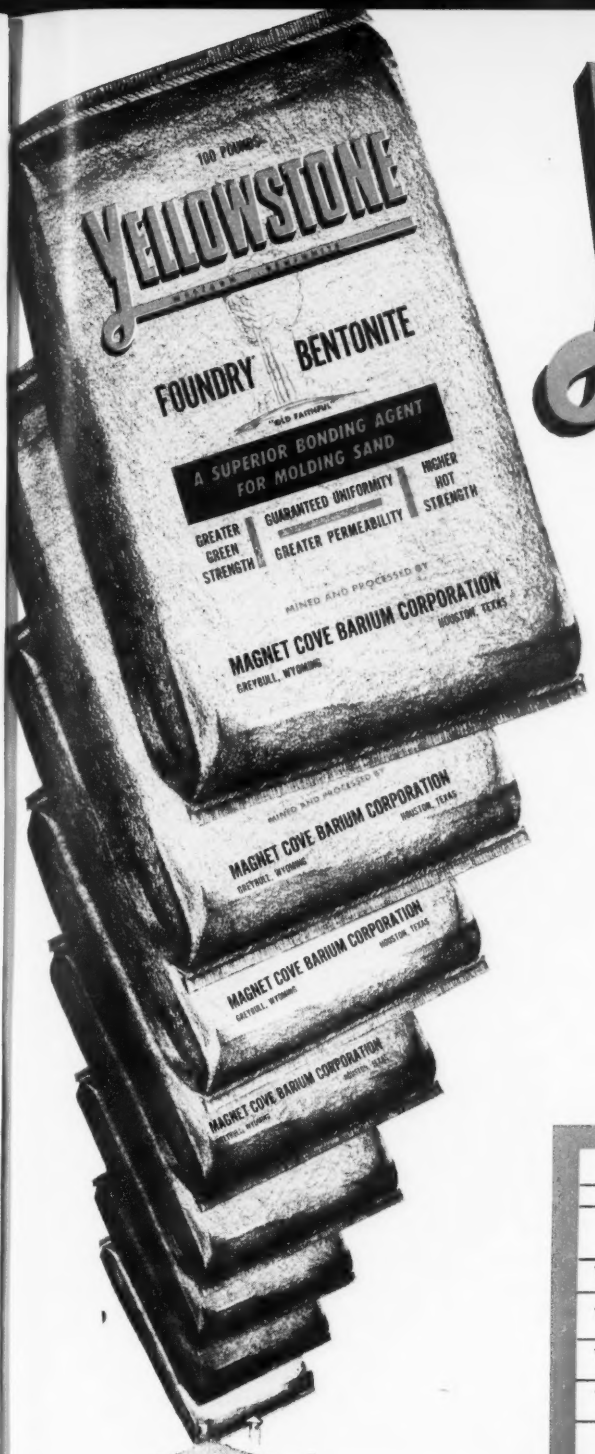
Dia. in inches	Weight of Rod or Cylinder 1 Inch Long When Cast in: Cast iron	Steel	Aluminum	Copper	Zinc	Gun metal	Yellow brass
30	184 1	200.3	68.08	225.8	178.5	222.8	213.8
30¼	187.2	203.6	69.21	229.6	181.5	226.5	217.4
30½	190.3	207.0	70.36	233 4	184.5	230.3	221.0
30¾	193.4	210.4	71.52	237.3	187.5	234.1	224.6
31	196 6	213.8	72.69	241.1	190.6	237.9	228.3
31¼	199.7	217.3	73.87	245.1	193.7	241.8	232.0
31½	202 9	220.8	75.05	249.0	196.8	245.6	235.7
31¾	206.2	224.3	76.25	253.0	199.9	249.6	239.5
32	209.4	227.9	77.45	257.0	203.1	253.5	243.3
32¼	212.7	231.4	78.67	261.0	206 3	257.5	247.1
32½	216.0	235.0	79.89	265.1	209.4	261.5	250.9
32¾	219.4	233.7	81.13	269.1	212.7	265.5	254.8
33	222.7	242 3	82.37	273.3	216.0	269.6	258.7
33¼	226.1	246.0	83.62	277.4	219.3	273.7	262.6
33½	229.5	249.7	84.88	281.6	222.6	277.8	266.6
33¾	233.0	253.5	86.15	235.8	225.9	281 0	270.6
34	236.4	257.2	87.44	290.1	229.3	286.2	274.6
34¼	239.9	261.0	88.73	294.4	232.6	290.5	278.7
34½	243 4	264.8	90.03	298.7	236.1	294.7	282.7
34¾	247.0	268.7	91.34	303.0	239.5	299.0	286.9
35	250.5	272.6	92.65	307.4	243.0	303.3	291.0
35¼	254.1	276.5	93.98	311.8	246.4	307 6	235.2
35½	257.7	230.4	95.32	316.2	249.9	312.0	299.4
35¾	261.4	234.4	96.67	320.7	253.5	316.4	303.6
36	265 1	288.4	98.02	325.2	257.0	320.9	307.9
36¼	268.7	292.4	99.39	329.7	260.6	325.3	312.2
36½	272.5	296.4	100.8	334.3	264.2	329.8	316.5
36¾	276.2	303.5	102.1	338.9	267.8	334 4	320.8
37	280.0	304.6	103 5	343.5	271.5	333.9	325.2
37¼	283.8	308.7	104.9	348.2	275.2	343.5	329.6
37½	287 6	312.9	106.4	352.9	278.9	348.4	334.1
37¾	291.4	317.1	107.8	357.6	282.6	352.8	338.5
38	295.3	321.3	109.2	362.3	286.4	357.5	343.0
38¼	299.2	325.5	110.7	367.1	290.1	362 2	347.6
38½	303.1	329.8	112.1	371.9	294.0	366.5	352.1
38¾	307.1	334.1	113.6	376.8	297.8	371.7	356.7

Dia. in inches	Weight of Rod or Cylinder 1 Inch Long When Cast in: Cast iron	Steel	Aluminum	Copper	Zinc	Gun metal	Yellow brass
39	311.1	338.4	115.0	381.7	301.6	376.6	361.4
40	327.2	356.0	121.0	401.5	317.3	396 1	380.1
41	343.8	374.0	127.1	421.8	333.4	416.2	399.4
42	360.8	395.5	133.4	442.6	349.8	436.7	419.1
43	378.1	411.4	139.8	464.0	366.7	457.8	439.3
44	395.9	430.8	146.4	485.8	383.9	479 3	460.0
45	414.2	450.6	153.2	503.1	401.6	501.3	481.1
46	432.7	470.8	160.0	531.0	419.6	523.9	502 7
47	451.8	491.5	167.1	554.3	438.1	546.9	524.8
48	471.2	512.7	174.3	578.1	456.9	570 4	547.4
49	491.1	534.2	181.6	602.5	476.2	593.4	570.4
50	511.3	556.3	189.1	627.3	495.8	618 9	594.0
51	531.9	578.7	196 7	652.7	515.8	644.0	618.0
52	553.0	601.7	204.5	678.5	536.2	669 4	642.4
53	574.5	625.0	212.4	704.9	557.1	695.5	667.4
54	596.4	648.3	220.5	731.7	578.3	721 9	692.8
55	618.7	673.1	228.8	759.0	599.9	748.9	718.7
56	641.4	697.8	237.2	786.9	621.9	776.4	745.0
57	664.5	722.9	245.7	815.3	644.3	804.4	771.9
58	688.0	748.5	254.1	844.1	667 1	832.9	799.2
59	711.9	774.5	263.3	873.5	690.3	861.8	827.0
60	736.3	801.0	272.3	903.4	713.9	891 3	855.2
61	761.0	827.9	281.4	933.7	737.9	921.3	884.0
62	786.2	855.3	290.7	964.6	762.3	951.7	913.2
63	811.7	883.1	300.2	995.9	787.1	982.6	942.9
64	837.7	911.4	309.8	1022	812.3	1014	973.1
65	864 1	940.1	319.6	1060	837.9	1046	1004
66	890.9	969.2	329.5	1093	863.9	1078	1035
67	918.1	998.8	339.5	1126	890.2	1111	1066
68	945.7	1029	349.7	1160	917.0	1144	1099
69	973.7	1059	360.1	1195	944.2	1179	1131
70	1002	1090	370.6	1230	971.7	1213	1164
71	1031	1122	381.3	1265	999.7	1248	1198
72	1060	1153	392.1	1301	1028	1284	1232
73	1090	1186	403.1	1337	1057	1319	1266
74	1120	1218	414.2	1374	1086	1355	1301

Dia. in inches	Weight of Rod or Cylinder 1 Inch Long When Cast in: Cast iron	Steel	Aluminum	Copper	Zinc	Gun metal	Yellow brass
75	1150	1252	425.4	1411	1116	1392	1336
76	1181	1285	436.9	1449	1145	1429	1372
77	1213	1319	448.4	1488	1176	1468	1409
78	1244	1354	460.2	1527	1207	1506	1446
79	1276	1339	472.0	1566	1238	1545	1483
80	1309	1424	484.1	1606	1269	1584	1521
81	1342	1460	496.2	1646	1301	1624	1559
82	1375	1496	508.6	1687	1334	1664	1598
83	1409	1533	521.1	1729	1366	1706	1637
84	1443	1570	533.7	1771	1399	1747	1676
85	1478	1603	546.4	1813	1433	1789	1717
86	1513	1646	559 4	1856	1467	1830	1757
87	1548	1634	572.5	1899	1501	1873	1798
88	1584	1723	585.7	1943	1536	1917	1840
89	1620	1762	599.1	1988	1571	1961	1882
90	1657	1802	612.6	2033	1606	2006	1924
91	1694	1843	626.3	2078	1642	2050	1967
92	1731	1883	640.1	2124	1679	2095	2011
93	1769	1924	654.1	2170	1715	2141	2055
94	1807	1966	668.3	2217	1752	2188	2099
95	1846	2003	682.6	2265	1790	2235	2144
96	1885	2051	697.0	2313	1828	2282	2190
97	1924	2034	711.6	2361	1866	2329	2236
98	1964	2137	726.4	2410	1905	2378	2282
99	2004	2181	741.3	2459	1944	2426	2329
100	2045	2225	756.3	2509	1983	2477	2376
101	2086	2270	771.5	2560	2023	2526	2424
102	2123	2315	786.9	2611	2063	2576	2472
103	2170	2361	802.4	2662	2104	2627	2521
104	2212	2407	818.1	2714	2145	2677	2570
105	2255	2453	833.9	2767	2186	2723	2619
106	2298	2500	849 8	2819	2223	2780	2669
107	2342	2547	866.0	2873	2270	2834	2720

The weight per running inch for diameter with a fraction such as 82⅜ can be found by interpolation as follows:

Add the product of the fractional part of the diameter multiplied by the difference between the weights in table corresponding to the next even inches above or below the given diameter to the weight corresponding to the next even inch under, the result being the required weight per running inch: Thus for cast iron ring 82⅜ diameter, from table 83 = 1409; 82 = 1375; 1409 − 1375 = 34; 34 × ⅜ = 13; 1375 + 13 = 1388, weight per running inch for 82⅜ diameter.



YELLOWSTONE

WESTERN BENTONITE

THE SUPERIOR SAND BONDING AGENT

Molding sands containing Yellowstone Western Foundry Bentonite have been proved in test after test to have greater green strength and higher permeability. Only a small amount of Yellowstone is required because of its great strength. The superior bonding characteristics permit the use of smaller amounts of bond and less water to temper. For better casting finish and less casting defects Yellowstone is your answer.

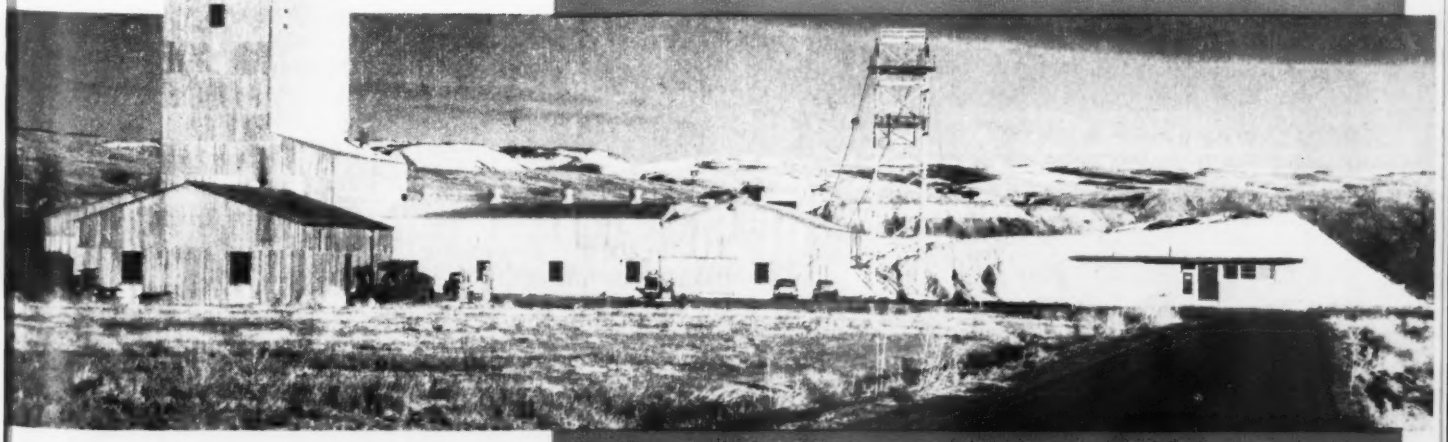
This superior performance is a result of Yellowstone bentonite being selected from the finest deposits of colloidal bentonite at the Yellowstone mines at Greybull, Wyoming. A stockpile containing in excess of 200,000 tons and special processing equipment in the world's most modern bentonite plant guarantee uniform quality in every bag of Yellowstone.

Ask your distributor for Yellowstone Western Foundry Bentonite.

Comparative tests by an independent research laboratory* prove Yellowstone's superiority. Tests were made with an added clay content of 5%.

	GREEN PROPERTIES (a)						DRY PROPERTIES (b)	
	pH	Green Compressive Strength psi	Permeability AFS Units	Toughness psi (c)	Deformation in./in.	Hardness (d) AFS Units	Compressive Strength psi	Permeability AFS Units
Yellowstone	9.4	18.1	107	145	0.008	93	60.5	115
Western Bentonite A	8.9	12.5	92	140	0.011	86	64.3	108
Western Bentonite B	9.3	15.5	86	134	0.009	85	76.4	102
Western Bentonite C	9.7	12.9	95	136	0.011	88	29.0	108

(a) Standard AFS Procedures.
(b) Oven dried 2 hours at 220F to 230F.
(c) Product of green compressive strength (psi) and deformation (inches per inch).
(d) Hardness measured on bottom of rammed specimen.
*Name on request.



THE WORLD'S MOST MODERN BENTONITE PLANT

MAGNET COVE BARIUM CORPORATION

ONE OF THE DRESSER INDUSTRIES

POST OFFICE BOX 6504 • HOUSTON 5, TEXAS

INDUSTRY BRIEFS

CHICAGO BELTING CO., has consolidated with its two subsidiaries, the Allis Rubber Corp. and the Allis Seal Corp. All three companies are now divisions of a new organization, the Chicago-Allis Mfg. Corp. The consolidation was made to effect greater efficiency in manufacturing and sales.

American Blower Corp., Division of American Radiator & Standard Sanitary Corp., Dearborn, Mich., has opened a direct factory branch office in Phoenix, Ariz. S. A. Meier is manager of the new office located in Room 227, Central-Madison Bldg., 128 South Central Ave., Phoenix, Ariz.

Barrett-Cravens Co., Northbrook, Ill., has opened its new million dollar plant. Facilities of three manufacturing plants and offices were moved into the 150,000 sq ft building. Products of the company include lift trucks, fork trucks and related material handling equipment.

Reichhold Chemicals Inc., 525 North Broadway, White Plains, N. Y., has occupied the entire building at that address. The additional space allows Reichhold to bring administrative, sales, foreign and export departments under one roof.

Mexico Refractories Co., Mexico, Mo., has purchased the assets of the Niles Fire Brick Co., Niles, O. Extensive property holdings in Ohio, Pennsylvania and Kentucky were included in the assets of over 3½ million dollars.

Kaiser Aluminum & Chemical Sales Inc., Oakland, Calif., has opened new branch sales offices at 304 Bennett Bldg., 1806 Madison Ave., Toledo, O., with George M. Roudebush as branch representative and at Gateway Center, Room 552, Building 2, East Wing, 140 Stanwix St., Pittsburgh 22, with W. W. Grimm as branch representative. A newly appointed distributor of aluminum alloy ingot is W. J. Bullock Inc., 1501 Erie St., Fairfield, Ala.

Forker Corp., Cleveland, manufacturer of tramrail systems, has appointed four new distributors. They are American Equipment Co., 1128 North Water St., Milwaukee; E. I. Knorring & Co., 7500 West Belmont Ave., Chicago; Fred Thrasher Co., 148 Millsaps Ave., Jackson, Miss.; and Urban M. Lodge, 2689 South Jackson St., Denver.

Leeds & Northrup Co., 4901 Steton Ave., Philadelphia, is building a 254,000 sq-ft one-story plant near North Wales, Pa., for the production of controllers, recorders and indicators. General offices and the manufacture of heat-treat furnaces and laboratory equipment will remain in Philadelphia.

Wiretex Mfg. Co., 40 Mason St., Bridgeport 5, Conn., has appointed Noble Equipment Co., Lagrange, O., agent for Ohio except for the Cincinnati and Youngstown areas. Noble also represents the Despatch Oven Co., Minneapolis.

Standard Alloy Co., 1679 Collamer Rd., Cleveland 10, O., has appointed new sales representatives. They are William McAtee, 626 North DeQuincy St., Indianapolis, sales representative for Indiana, and the Day Engineering Co., Ardmore, Pa., representative for eastern Pennsylvania, southern New Jersey, Delaware, Maryland and Virginia. Elmer A. Terwell, 4160 North Elston Ave., Chicago, will service Wisconsin.

Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh, has started an expansion and modernization program designed to integrate its manufacturing operations more fully. The program includes establishment of centralized research and development functions to serve the company in developing new products and pioneering new activities.

Eclipse Fuel Engineering Co., 1002 Buchanan St., Rockford, Ill., has completed a new 10,000 sq ft plant for its Canadian subsidiary, Eclipse Fuel Engineering Co. of Canada Ltd., at 20 Upjohn Rd., Toronto, Ont. The new Canadian plant will manufacture, engineer and distribute industrial and commercial heating equipment.

Minco Products Corp., 2200-2345 Miller Rd., Saginaw, Mich., has appointed Williston & Co., Delta, O. representative for the sale of mineral bonding material and western bentonite. The latter has been a distributor of foundry ceramics and other foundry products for a number of years.

Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., has installed a new $300,000 electric arc swing-roof furnace. Capacity of the furnace is 125 tons per day. It will enable the company to expand its production of alloy steel castings.

Empire Foundry & Pattern Co., 2729 Sand Springs Rd., Tulsa, Okla., plans an expansion program to double foundry output. Included in the $140,000 program is a new office building.

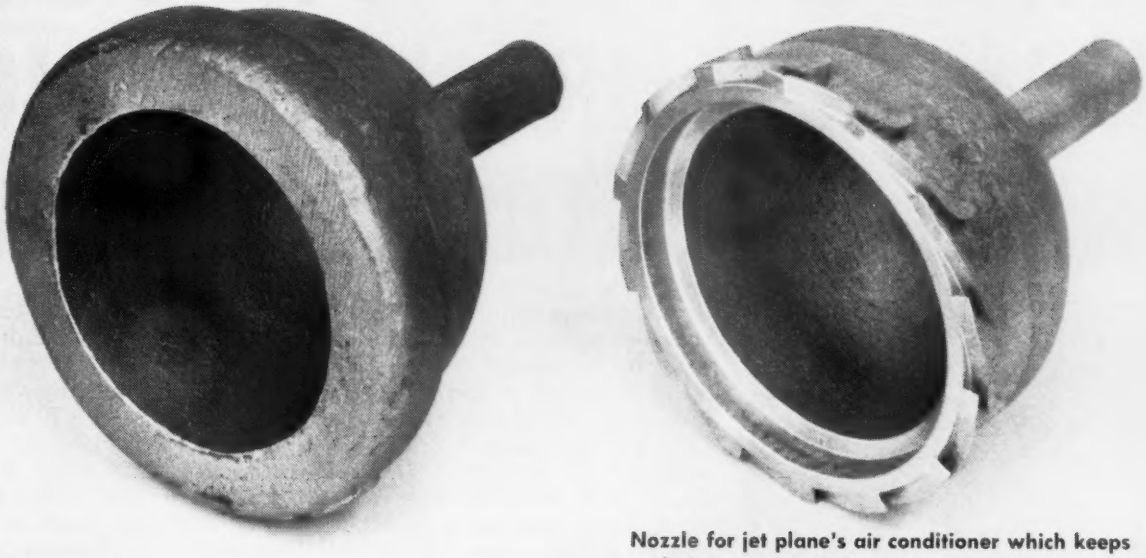
Caldwell Casting Co., Falls Rd. & Shoemaker Ave., Baltimore, producer of small nonferrous castings and high pressure injection molded diecastings, is installing equipment which will increase production.

J. C. Corrigan Co., 41-47 Norwood St., Boston 22, conveyor manufacturer, has opened a new sales office at 420 Lexington Ave., New York. Gilbert Lavoie is sales engineer in charge of the office.

Republic Steel Corp., 3100 East 45th St., Cleveland 27, has appointed the Pat Donovan Co., 53 Park Ave., Dayton 9, O., to sell and distribute its materials handling equipment.

Bristol Co., Waterbury, Conn., instrument manufacturer, has moved its application engineering department into a new office building in Waterbury.

BULLARD BUILDS NEW FOUNDRY: New England's newest large gray iron foundry is being built by the Bullard Co., Bridgeport, Conn. The new building, 245 x 600 ft., will embody the latest developments in dust and smoke control, material handling and equipment. Architect's drawing above shows a 120 x 200 ft-building adjacent to the foundry, which will house foundry offices, the pattern shop, pattern storage and employee locker rooms. Estimated cost of the foundry and equipment is $6 million. Production in the new foundry is expected to start by the end of 1955



Nozzle for jet plane's air conditioner which keeps cockpit temperature down.

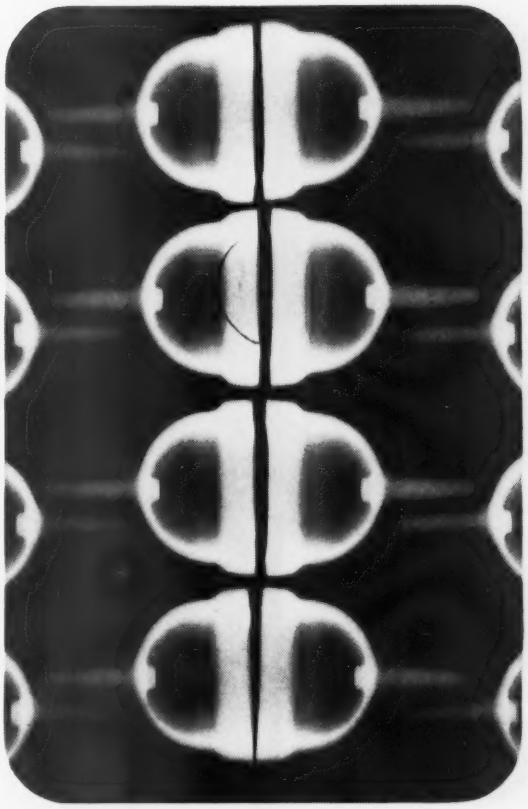
RADIOGRAPHY *says:* "O.K. to Machine"

COMPLEX MACHINING is required to transform this casting into the precision nozzle of a jet plane's air conditioner.

Fourteen intricate, curved vanes are cut in the rough casting's rim. Tolerance is .002 inch. This means plenty of high-cost machine time—which could be a total loss if it is left to the cutting tools to find any defect in the casting.

Radiography avoids that . . . shows up shrink or other faults before machining is begun. Only those castings proved sound are worked. Time and money both are saved.

Easy to see, isn't it, how radiography pays off? And if you would like to know other ways it can help you, like improving yield in production runs, here's a suggestion: Talk it over with your x-ray dealer. Or, if you like, drop us a note saying, "Send me a free copy of Radiography as a Foundry Tool."



Radiograph shows castings with "shrink"—saves costly machining time.

EASTMAN KODAK COMPANY
X-ray Division
Rochester 4, N.Y.

Radiography . . .

another important example of Photography at Work.

Kodak
TRADE-MARK

STRAIGHTEN OR COIN MALLEABLE IRON CASTINGS ON THE VERSATILE CECOSTAMP

Straightening malleable iron castings has been modernized, speeded up and rejects almost eliminated in a number of foundries by the installation of Cecostamps, replacing old-fashioned strap hammers or board drop hammers. The Cecostamp's blow is instantly controllable by the operator. Misalignment is practically unheard-of—due to the rigid construction of the Cecostamp. There are no time-consuming "friction" or stroke adjustments. Production is high. Maintenance costs are low. Operation is very simple and where very tiring on other types of hammers used formerly, there is little fatigue on the part of the operator with the Cecostamp.

Write for complete details on the Chambersburg CECOSTAMP

Cecostamp straightening malleable iron castings at large foundry in Canada. Board drop hammer was formerly used for this work, requiring stoppage for adjustments and stroke set-up. Cecostamp permits almost continuous operation.

Cecostamp coining malleable iron castings in foundry of implement manufacturing company. Formerly done on a strap hammer, production has been speeded up and accuracy insured.

CHAMBERSBURG ENGINEERING COMPANY • CHAMBERSBURG, PENNA.

CHAMBERSBURG

THE HAMMER BUILDERS

OBITUARY

SAMUEL W. HEALY, 47, production maneger, General Metals Corp., Oakland, Calif., died Dec. 3. Mr. Healy had been with the company 5 months. He was formerly associated with Central Foundry Division, General Motors Corp., Saginaw, Mich., where he became works manager, assistant to general manager and manufacturing manager.

* * *

William C. Frye, 77, director and former president, Chain Belt Co., Milwaukee, died Nov. 15. Mr. Frye retired as president in 1923 but continued as a member of the board of directors. He was associated with the company for 60 years. He was also a director of Sivyer Steel Casting Co., Milwaukee, and Oliver Corp., Chicago.

* * *

Thomas W. Glasscot, 81, formerly Milwaukee district sales representative for Pickands, Mather & Co., Cleveland, died Dec. 16. Mr. Glasscot was associated with the company more than 50 years when he retired in 1941.

* * *

Howell C. Cunningham, 79, since 1952 chairman of the board of directors, Crucible Steel Casting Co., Lansdowne, Pa., died Dec. 26. An officer of the company since it was organized in 1905, he was previously secretary, vice president and treasurer.

* * *

Matthew R. Dutton, 67, president, Service Foundry Co., Beaumont, Tex., died there Dec. 10. Mr. Dutton organized the company in 1919 and served as secretary-treasurer prior to becoming president.

* * *

Fred C. Spinti Sr., 80, until his retirement 5 years ago, superintendent of the pattern department, Harnischfeger Corp., Milwaukee, died Dec. 18.

* * *

George H. Engler, for a number of years secretary-treasurer, Fremont Foundry Co., Fremont, O., died recently.

* * *

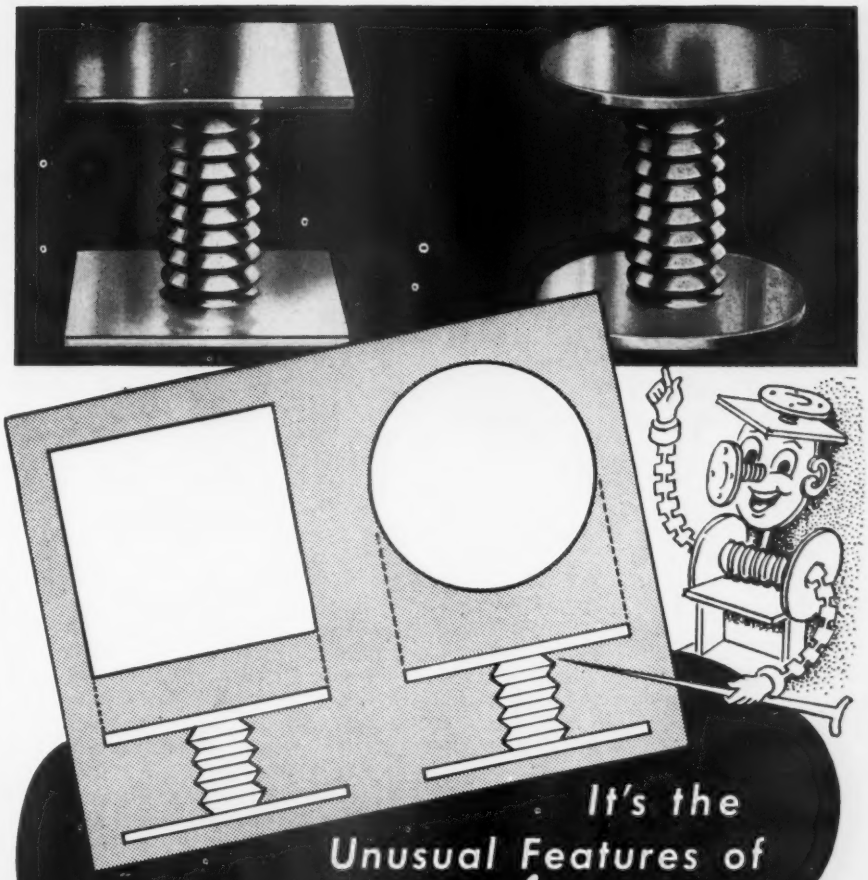
Thomas E. Akers, 66, chairman of the board and former president of Dominion Brake Shoe Co., Canada, died Dec. 5.

* * *

Wiley W. Stephens, 87, former chairman of Stephens-Adamson Mfg. Co., Aurora, Ill., died Dec. 29.

* * *

Louis J. Gasser, 66, owner, Gasser Bronze & Aluminum Co., South Gate, Calif., died Dec. 25.



It's the Unusual Features of

Milwaukee CHAPLETS

that Insure Instant Fusing in any Casting

It's the sharply cut "thread stem" design that insures instant fusing. Metal melts at the edges first, that's why the sharp edges "burn in" quickly and completely to insure instant fusing which results in freedom from leakers. As the fusing cycle slows up through the base of the thread and into the stem itself, there is ample time for adequate and proper core support. Here is a design where fusion takes place at exactly the right speed to give you both instant fusion plus proper core support.

Write for Samples and Prices

Milwaukee Chaplet & Mfg. Co.

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HINES POP-OFF FLASK

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Fig. 1—This over-all view of the mechanized, direct-fired furnace also shows the charge table pusher mechanism and return gravity conveyors

Mechanized Furnace Improves

Heat Treatment of Gray Iron

TO PRODUCE more nearly uniform gray iron castings, Fremont Foundry Co., Fremont, O., recently placed in operation a Surface Combustion direct gas-fired furnace equipped with a cooling chamber and with mechanized handling for continuous production.

A pusher mechanism at the charge end of the furnace heating chamber pushes two trays through the furnace on parallel sets of roller rails. Each 18 x 26-in. tray is moved forward by direct contact with the preceding tray and moved by the charge table pusher. In this manner two rows of trays are moved at a uniform, controlled speed through the heating chamber and the cooling zone.

As trays are pushed out of the cooling zone, they pass onto an inclined gravity roller conveyor which moves them through a U-turn along the side of the furnace to a point

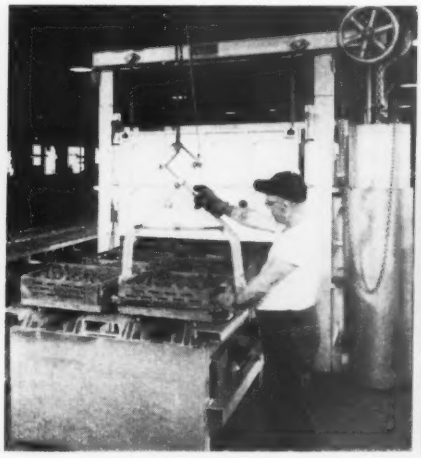

Fig. 2—In closeup of charge end of furnace, operator is placing loaded trays on the charge table

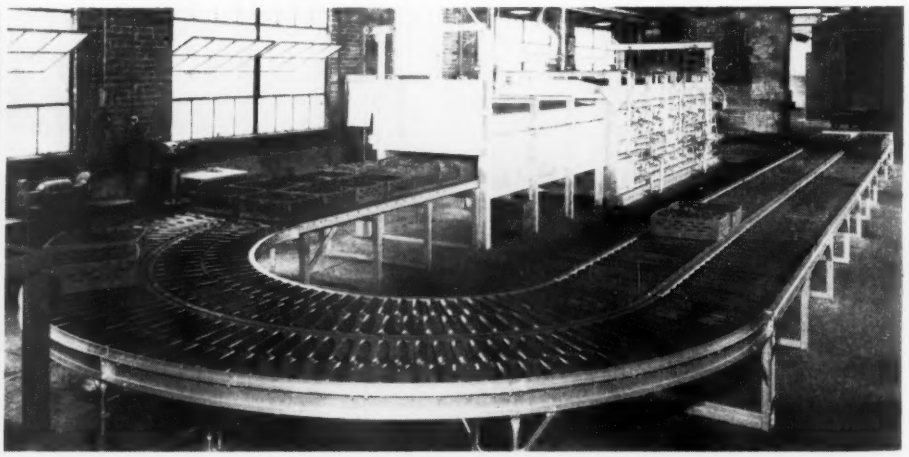

Fig. 3—View of discharge end of furnace shows 12-ft cooling zone from which trays are pushed, passing onto the inclined gravity roller conveyor. They make the U-turn and are returned to charge end of furnace

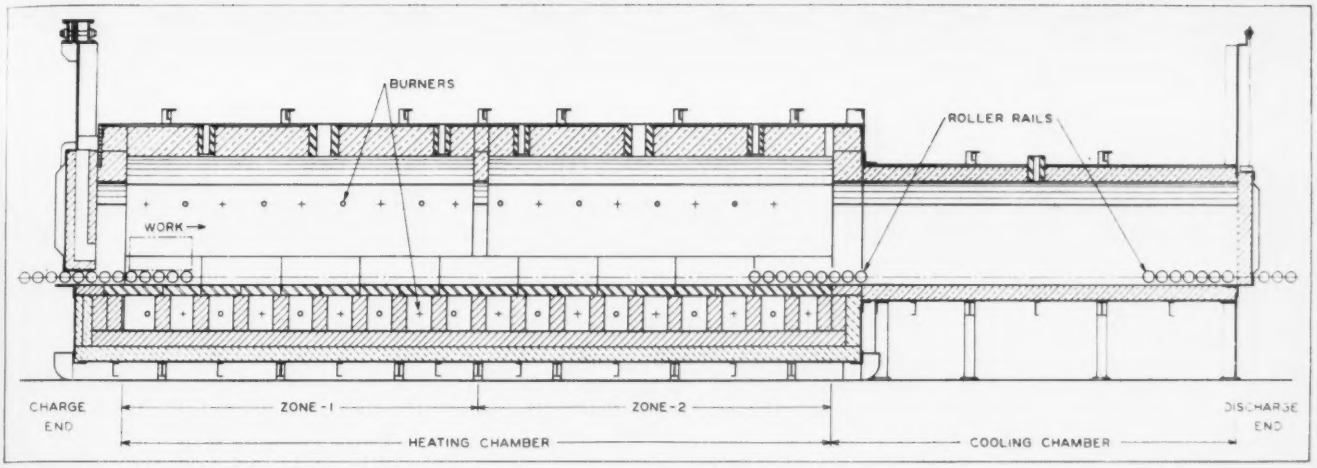

Fig. 4—Illustration shows a cross section of the furnace. The heating chamber is in two zones, totals 18 ft. At right is 12-ft cooling zone

next to the charge end. At this point the operator lifts the castings and dumps them into tote boxes with a hoist-turnover arrangement. He then transfers the empty trays to the charge table. Empty trays are loaded by the same operator and made ready for the automatic cycle back through the furnace.

By adjustments of the time clock on this charging mechanism, any sequence of push times can be obtained as desired. Present practice uses two basic push cycles of 5½ and 11½ minutes.

Gray iron castings up to 75 lb are produced by Fremont Foundry. The metal is a medium strength iron (30,000 psi minimum tensile) of fine-grain structure. This iron has good wearing qualities and is used for many pressure applications. All production is of the jobbing type. No matter how large or small the order, heat treat furnace equipment in this foundry must accommodate it.

Previous furnace equipment at Fremont Foundry included two direct-fired carbottom furnaces for all heat treatments. Two men were required on each furnace for charging and discharging. Loading was rather haphazard, and heat treatment not uniform from piece to piece in each charge. For many applications, these nonuniform results were acceptable. Present customer demands, however, require much better uniformity from casting to casting and a controlled grain structure throughout each.

With the new continuous gas-fired furnace the same production tonnage capacity is realized with only half the floor space formerly required. Excellent uniformity is now being achieved with grain structures easily controlled as desired. Machinable structures are obtained after all heat treatments whether the specifications require hard, intermediate or soft material.

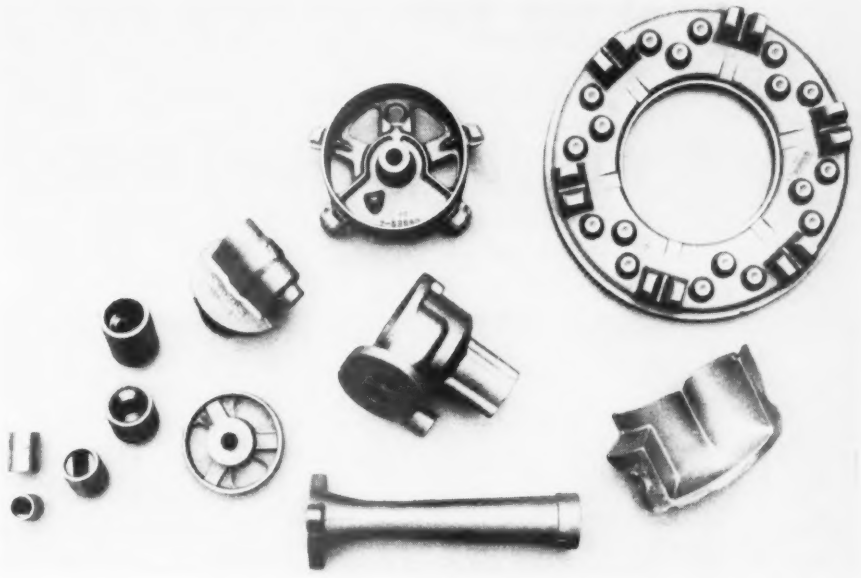

Fig. 5—These medium-strength castings are typical of those heat treated in the continuous furnace. Castings produced weigh up to 75 lb each

Two Basic Cycles—Either of two basic processes is utilized for all heat-treated production. All annealing is carried out at a temperature of 1450° F with a push cycle of 11½ minutes—total furnace time, 2½ hours. The second process, involving stress relieving at 1000° F, requires a push cycle of 5½ minutes—total time 65 minutes. The latter process is usually required for high pressure applications in which the castings in service must withstand hydraulic pressures up to 2500 psi. Close control of grain structure is extremely important for these applications.

The furnace operating cycle under full production is essentially as follows:

1. Operator places two loaded trays on charge table and removes last two trays from end of discharge run-out conveyor.

2. At end of push-cycle time (11½ or 5½ minutes), pusher will start if the trays are in position at charge end. If not, buzzer sounds to notify operator that furnace must be conditioned for next cycle. A red light also flashes after a portion of the previous cycle has elapsed.

Trays move out of the cooling zone under pusher power. As they move around the U-turn of the run-out table, gravity takes over and brings them to the discharge position, adjacent to the charge end of the furnace. At this point the operator dumps each tray, with the hoist-turnover arrangement, into tote boxes. Tote boxes are removed by fork lift truck to the next processing department.

Furnace 30 Feet Long—The heating chamber of this furnace is 18 ft long, and the cooling section 12 ft.

(Concluded on page 155)

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will cut your casting costs . . .

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2. permits use of all the system sand
3. gives more accurate pattern reproduction
4. produces better molds in less time
5. improves casting quality
6. cuts machining and labor costs
7. gives faster, cleaner shakeouts

For Bulletin No. 16 more fully explaining the advantages you can get from SAND-MEX, write to

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(*Concluded from page* 153)

including trays under the door arch the heating and cooling sections accommodate 44 trays in two rows. Zone 1 holds 14 trays, zone 2 holds 12 and the cooling chamber 18.

Maximum furnace capacity at 1450° F is 3000 lb of work per hour. This figure will vary, of course, according to type and size of casting processed at that temperature. Trays for a full furnace load add about 800 lb to this figure. The furnace can be operated at a maximum temperature of 1750° if necessary.

The heating chamber is made up of two zones of individual, automatically controlled temperature. This arrangement provides for uniform temperatures and permits flexible control of the furnace to achieve different cycles.

The chamber utilizes automatic proportioning, low-pressure velocity burners located in the furnace side walls and arranged to fire above and below the work. Through the entire range of turndown, a correctly proportioned fuel-air mixture is controlled by only one valve. The front zone of this heating chamber has slightly more heat input capacity than the rear zone.

Each burner has a premix type, constant-burning pilot. Approximately 2000 cfh of natural gas are required under full production to heat the work and hold the furnace at about 1450° F.

The 12-foot long slow-cool chamber is fully insulated and equipped with an adjustable door.

How To Use Power Cranes

Power Crane & Shovel Association, 74 Trinity Pl., New York 6, has issued a bulletin on application of free-moving cranes in industrial plants. The pictorial study shows the use of powered cranes with 5 to 60-ton capacities for outside warehousing and storage. Several crane attachments are shown. Technical bulletin 5 costs 50 cents; free copies are available to technical schools, universities and engineering students.

Book Review

Dictionary of Metallurgy, by R. T. Rolfe, 287 pages., published by Chemical Publishing Co., 212 Fifth Ave., New York. Price $5.75.

Standard reference for the metallurgist and engineer is provided by encyclopedic treatment of over 1300 entries appearing in the book. Cross referencing and a balance between theory and practice add to its value. Pertinent terms from collateral sciences are included.

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Uses—The CESCO No. 602 mask with Duratex hood gives complete protection against sand, shot, and grit in foundries, steel mills, and refineries. Its utility adapts it for use in shops doing sand blasting and metallizing. Workers produce more when equipped with a CESCO No. 602.

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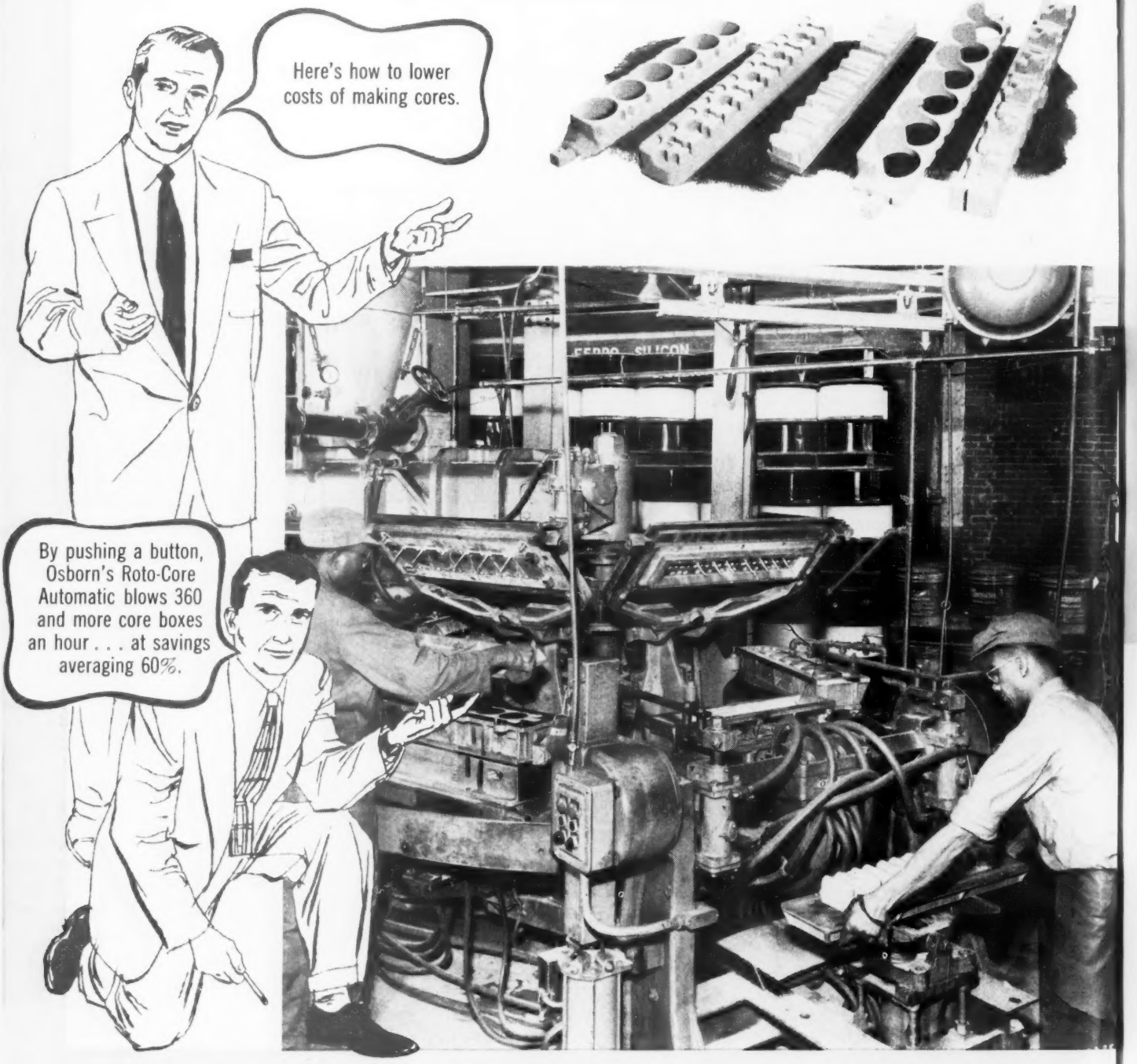
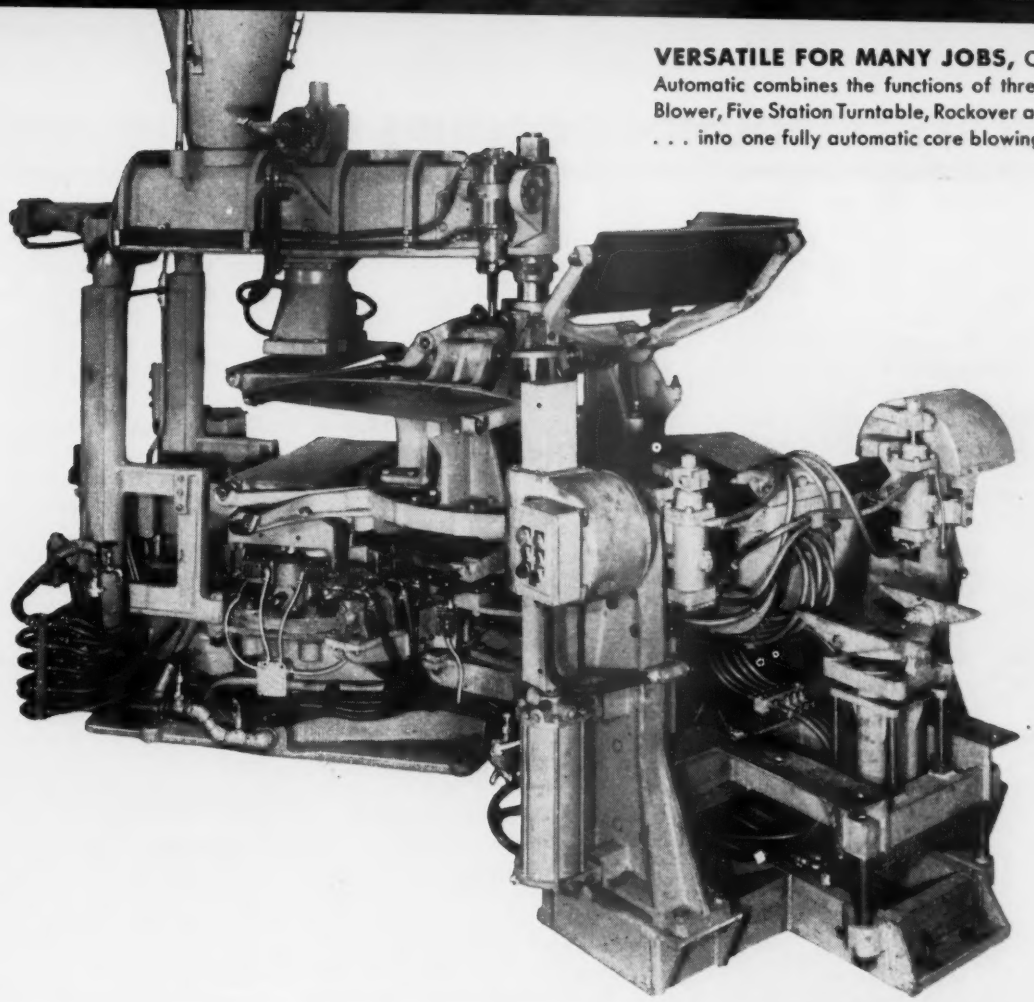
Another example of Osborn leadership and advanced engineering


Here's how to lower costs of making cores.
By pushing a button, Osborn's Roto-Core Automatic blows 360 and more core boxes an hour . . . at savings averaging 60%.

AUTOMATION FOR BLOWING CORES

. . . another Osborn development to cut costs of castings



VERSATILE FOR MANY JOBS, Osborn Roto-Core Automatic combines the functions of three units . . . Core Blower, Five Station Turntable, Rockover and Draw Machine . . . into one fully automatic core blowing machine.

Simplifies core blowing

EASY TO SET UP. The cost-saving benefits of automation can be applied to producing cores on short and long run jobs. That's because Osborn's Roto-Core, when equipped with Cope Handler, is simple to set up . . . quick to change over from job to job. Setups take less than three minutes.

When blowing different cores, the Cope Handler is used to carry and position a separate blow plate over each box. Each plate has blow holes of proper size and position to suit the individual core box.

SIMPLE TO OPERATE. Most jobs require only two men. One man positions drier plates, a second man removes cores. Core boxes are automatically cleaned and sprayed at a make-ready station where core wires are set if required.

PRODUCTION IS STEADY. Maximum uniform production can be achieved with minimum of training since operation is automatic . . . on a preset time cycle.

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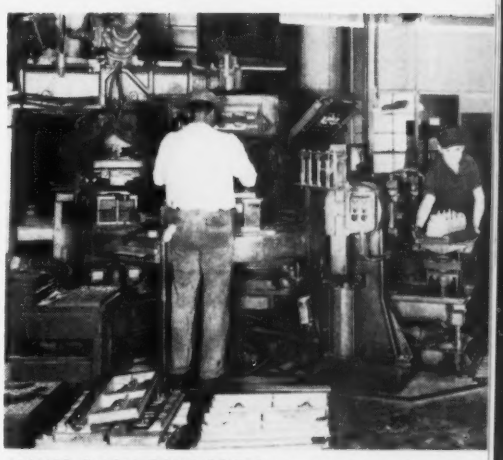
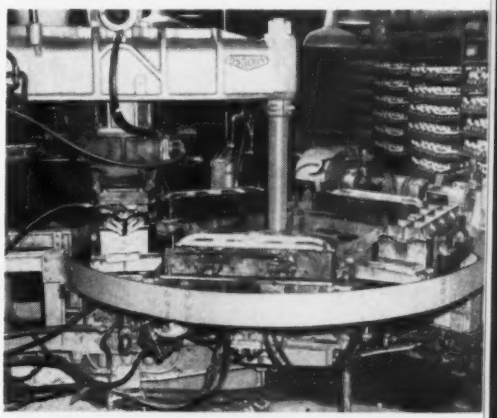


MAKES 5 DIFFERENT CORES in succession with one setup using the Cope Handler. Osborn Roto-Core Automatic handles up to 5 different cores. One operator places driers . . . second man removes blown cores.



MAKES 5 DUPLICATE CORES at one time. Cope Handler is not used when duplicate cores are produced on the Roto-Core Automatic. Cores are uniform, high quality. Production is on a preset time cycle to turn out up to 360 blown core boxes an hour.

ACTIVITIES OF FOUNDRY GROUPS

St. Louis: Attendance prizes awarded by local suppliers added a Christmas touch to the Dec. 9 meeting of the AFS chapter, with over 150 members and guests attending. It was announced that the Missouri Valley Regional Conference will be held Oct. 20-21 at Missouri School of Mines, Rolla, Mo. Webb L. Kammerer, Midvale Mining & Mfg. Co., is conference chairman.

Technical Chairman Henry Meyer, General Steel Castings Corp., introduced the speaker, J. S. Schumacher, chief engineer, Hill & Griffith Co., who spoke on "Foolproof Sand." He listed the following properties as being typical of a foolproof sand for gray iron: 3.5 water, 70 to 90 green permeability, 7 to 9 psi green compressive strength and 80 mold hardness. By charts it was shown that only with a four-screen sand does the permeability level off with increased ramming.—*Jack R. Bodine Jr., Bodine Pattern & Foundry Co.*

Southern California: About 350 members and guests attended the AFS chapter's annual Christmas Party at Lakewood Country Club, Long Beach, Calif., on Dec. 11. Valuable prizes were awarded lucky ticket holders. Ray Orr, entertainment committee chairman, was responsible for the arrangements.

In connection with the national AFS apprentice contest the chapter is sponsoring a local contest open to qualified apprentices and students of trade schools. Winners will be announced in March. Emil Peschke, Reliance Regulator Division, American Meter Co., is chairman of the apprentice molders committee. James Oliva, Pattern Supply Co., is chairman of apprentice patternmakers committee.—*W. G. Stenberg, U. S. Electrical Motors Inc.*

Saginaw Valley: Over 170 members and guests attended the Dec. 2 meeting of the AFS chapter at Frankenmuth, Mich. Members of the Chesapeake, Toledo, Saskatchewan and Michigan State College chapters were present. Woodrow Holden, Eaton Mfg. Co., chapter chairman, presided. R. Foster, Bay City Foundry, chapter technical chairman, introduced the speaker, H. H. Kessler, Sorbo-Mat Process Engineers, St. Louis, who discussed "Factors Affecting the Quality of Castings."

Mr. Kessler emphasized that to make clean, solid castings it is essential to control all raw materials and maintain a consistent quality of metal being poured at proper temperatures into a mold that has been correctly designed from the standpoint of gates, runners and risers. Centerline shrinkage in nodular irons can be minimized, according to Mr. Kessler, by the addition of rare earth fluorides together with magnesium and/or cerium inoculants. Sulphur can be reduced by treatment of iron in the ladle with calcium carbide. Gating and risering principles also were discussed.—*Nicholas Sheptak, Dow Chemical Co.*

Birmingham: First mixed meeting of the AFS chapter saw 60 members and their ladies gather in the Terrace Ball Room, Tutwiler Hotel, Birmingham, on Dec. 10. L. N. Shannon, vice president, Stockham Valves & Fittings Inc., was speaker and discussed, for the benefit of the ladies, the aims of the AFS. Joe Travis, manager, billing department, American Cast Iron Pipe Co., served as toastmaster.—*J. A. Wickett, U. S. Pipe & Foundry Co.*

Connecticut: Quinnipiac Club, New Haven, Conn., was the site of the Dec. 15 meeting of the Connecticut Non-Ferrous Foundrymen's Association. Annual election and other business was coupled with a short round-table discussion, led by S. W. Chappell Jr., Electric Boat Co., chapter chairman. Individual questions on heating temperatures, gluing or pasting of shell molds to avoid finning, sprue disintegration, pattern woods, heat treatment of aluminum patterns and gating procedures were discussed.—*Frank B. Diana.*

Rochester: "New Developments in Foundry Welding" was the topic of L. D. Richardson, national supervisor of sales and service, Eutectic Welding Alloys Corp., Detroit, at the AFS chapter meeting on Dec. 7. Mr. Richardson told and showed the foundrymen how money could be saved by reclaiming defective castings. He also discussed maintenance and repair of foundry equipment by welding.—*H. G. Stellwagen, Hetzler Foundries Inc.*

Metropolitan Brass: Metropolitan Brass Founders Association held its 44th anniversary celebration at the New Brass Rail, New York, on Nov. 6. About 180 members and guests attended, representing 24 foundries and several suppliers. Cocktails, din-

(Continued on page 160)

NORTHEASTERN OHIO Chapter of the AFS held its annual Christmas Party Dec. 9 in the Rainbow Room of Hotel Carter, Cleveland. View above shows a portion of the 1000 members and guests who attended the party. A dinner and traditional floor show were the highlights of the program. Photograph by Harold Wheeler, Superior Foundry Inc.

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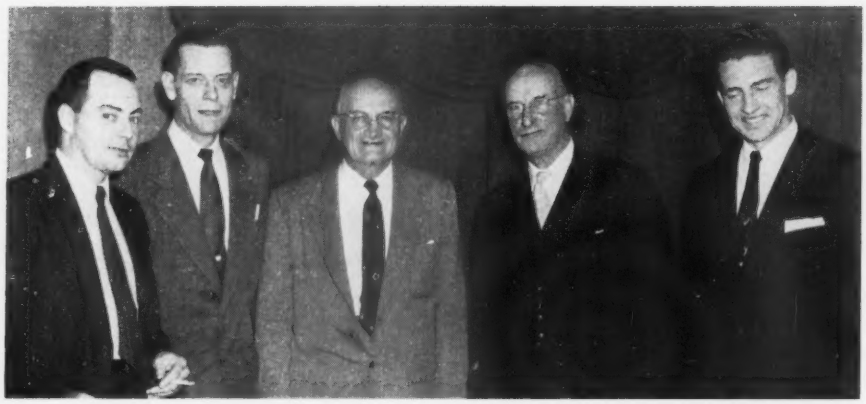

WESTERN MICHIGAN Chapter of the AFS met Dec. 6 at Bill Sterns, Muskegon Heights, Mich., to hear Hyman Bornstein, John Deere & Co., retired, speak on "Practical Metallurgy." Left to right above are George Bartlett, Neway Equipment Co., chapter vice chairman, E. T. Price, Cadillac Malleable Iron Co., technical chairman, Mr. Bornstein, G. W. Cannon, retired, Campbell, Wyant & Cannon Foundry Co., John A. Van Haver, Sealed Power Corp., chairman

(*Continued from page* 158)

ner, floor show and dancing were part of the varied program.—*George Staub.*

Northern California: A five-minute talk by each of 12 speakers featured the Dec. 10 meeting of the AFS chapter at Hotel Shattuck, Berkeley, Calif. Participants spoke on a wide variety of timely and pertinent subjects. Speakers and subjects were: Don Mason, plant engineer, Superior Electrocast Co., "The CO_2 Process," Nino Davi, superintendent, Pacific Steel Castings Co., "Use of Dyes in Core and Molding Sands," James Campbell, engineering department, University of California, "Rapid Moisture and Density Determination, by Radiation Methods, of Molding Sands."

Michael Furey, metallurgist, Mare Island Navy Yard, "Bearing Metals," Don Caudron, superintendent, Pacific Brass Foundry, "pH Factor," Ed Ritelli, vice president, General Foundry Service Corp., "Flasks," Angelo Castagnola, owner, ABC Pattern Works, "Patterns," and Maurice Sandes, Division of Apprenticeship, State of California, "Apprenticeship."

Harold Wegner, manager, Pacific Foundry Co., "Alloyed Castings," Robert Fisher, metallurgist, Vulcan Foundry Co., "Control of Basic Slag," James Francis, president, Micro Metals, "The Shell Molding Game," and Harold Hirsch, assistant works manager, Amsco Division, American Brake Shoe Co., "Safety."—*J. M. Snyder, Joseph Musto Sons-Keenan Co.*

Western Michigan: Approximately 125 members of the AFS chapter turned out Dec. 6 at Bill Sterns, Muskegon Heights, Mich., to hear Hyman Bornstein, retired, speak on "Practical Metallurgy." Mr. Bornstein was associated with John Deere & Co. as manager of materials engineering and chief engineering consultant. He evaluated research and technical know-how and their value to industry when adopted to everyday industrial problems. He pointed out many ways that metallurgical information can be useful in plant methods and operations. —*W. W. Hicks, Sealed Power Corp.*

Cleveland Non-Ferrous: Regular monthly meeting of the chapter of the Non-Ferrous Founders' Society was on Dec. 2 at Cleveland Athletic Club, Cleveland, to hear Clyde A. Sanders, vice president, American Colloids Co., Chicago, discuss synthetic resins for synthetic sands. His talk was accompanied by slides showing casting defects caused by improper use of sands.—*Walter O. Larson Jr., Grafton Foundry Co.*

Eastern New York: Seventh annual Christmas Party of the AFS chapter at Panetta's Restaurant, Menands, N. Y., on Dec. 14, attracted 200 members and guests. Buffet supper, eye-opening entertainment and distribution of door prizes were highlights of the party.—*L. J. DiNuzzo, General Electric Co.*

Wisconsin: Annual Christmas party of the AFS chapter was held Dec. 10 at the Crystal Ballroom, Hotel Schroeder, Milwaukee. About 535 members and guests attended. Dinner and floor show were highlights of the program.—*John E. Hubel.*

Ohio State: December meeting of the AFS student chapter was held Dec. 7 in the Industrial Engineering Bldg., on the campus at Columbus, O. Ten

(*Concluded on page* 162)

NORTHERN CALIFORNIA Chapter of the AFS met Dec. 10 at Hotel Shattuck, Berkeley, Calif., and a roundtable featured the program. Participants in the program are shown above. Left to right, front row, John Bermingham, E. F. Houghton Co., chapter chairman, Don Mason, Nino Davi, James Campbell, Michael Furey, Don Caudron, David Sutch, Ed Ritelli, and Angelo Castagnola. Left to right, back row, Maurice Sandes, Harold Wegner, Robert Fisher, James Francis, Harold Hirsch, Harold Henderson, H. C. Macaulay Foundry Co., program moderator, and Clayton Russell, Phoenix Iron Works, program chairman. As each speech was limited to five minutes, a wide variety of timely subjects was covered

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TWIN CITY Chapter of the AFS met Nov. 9 to hear a talk by George T. Boli, president, Northern Malleable Iron Co. At the same meeting E. J. Egghazi and T. C. Anderson, apprentice patternmakers, American Hoist & Derrick Co., and Northern Malleable Iron Co., respectively, received citations for outstanding achievement in the recent nation-wide Ford Industrial Arts contest. It was the third citation for Mr. Egghazi, the second for Mr. Anderson. Above, left to right, are J. W. Costello, pattern supervisor, American Hoist & Derrick Co., Mr. Egghazi, Mr. Anderson, and A. W. Becklund, pattern foreman, Northern Malleable Iron Co. Photograph is through the courtesy of R. J. Mulligan, Archer-Daniels-Midland Co.

(*Concluded from page* 160)

members were present to hear George Schippereit, Battelle Memorial Institute, discuss "The Winning and Forming of Titanium Products." Dallas Marsh, Cooper-Bessemer Corp., Mt. Vernon, O., chapter industrial adviser, was a guest at the meeting.—*W. Fred Clutton.*

Chicago: Wisely designed and soundly produced castings will save the customer money and bring the foundry new business that now is dominated by forgings, stampings and weldments. This was the message of W. G. Ferrell, vice president, Auto Specialties Mfg. Co., St. Joseph, Mich., imparted to 160 members and guests of the AFS chapter at its Jan. 3 meeting at the Chicago Bar Association.

Speaker also asserted that the castings industry can prove by tests and service that their products will outperform competitive forgings and weldments and with a cost advantage. To accomplish this it is necessary that the engineering and design be correct and that patterns, rigging and foundry equipment be geared to meet the requirements.

Robert L. Doelman, Miller & Co., chapter chairman, presided at the general portion of the meeting. James T. Moore, Wells Mfg. Co., chapter vice chairman, officiated at the technical session. Annual Ladies' Night will be held Feb. 12 at the Morrison Hotel. The Feb. 7 meeting, designated as National Officers' Night, will feature four roundtables.—*Erle F. Ross.*

CHICAGO Chapter of the AFS met at the Chicago Bar Association on Jan. 3. Thirteen past presidents of the chapter were honored at the meeting. Twelve of them are shown above. It was announced that a Past President's Club was being formed. James Thomson, chief works engineer, Continental Foundry & Machine Co., and club president, reviewed the history of the Chicago Chapter and introduced the club members present. Left to right: Mr. Thomson; L. J. Wise, Chicago Malleable Castings Co.; H. W. Johnson, Wells Mfg. Co.; L. H. Rudesill, Griffin Wheel Co.; G. P. Phillips, International Harvester Co.; A. P. Gierach, American Manganese Division, American Brake Shoe Co.; C. K. Faunt, Christensen & Olsen Foundry Co.; W. D. McMillan, International Harvester Co.; C. V. Nass, Beardsley & Piper Division, Pettibone Mulliken Corp.; W. W. Moore, Burnside Steel Foundry Co.; J. H. Owen, Harbison-Walker Refractories Co., and J. A. Rassenfoss, American Steel Foundries. Photo by Fred Ridenour, Whiting Corp.

Central Illinois: A vaudeville show, dinner, dancing and drawing for valuable gifts provided entertainment for 460 members and guests of the AFS chapter at its annual Christmas Party on Dec. 11, at American Legion Hall, Peoria, Ill.—*Clarence J. Turner, Caterpillar Tractor Co.*

British Joint Council Holds London Meeting

BRITISH Joint Iron Council held its annual meeting in London, on Nov. 2. N. P. Newman, chairman, Council of Ironfoundry Association, was elected president, replacing Sir Frederick Scopes, who resigned after six years in the post. Sir Frederick remains chairman of the Council of Iron Producers.

The executive committee's annual report for 1953-54 shows that July, 1953, to June, 1954, was the first complete year since the war in which buyers' market conditions applied to most sections of the iron foundry industry. Total casting output for the period was 4,110,650 net tons, or 13,620 tons over the previous year. The accompanying table shows the main divisions of the output.

IRON CASTINGS PRODUCTION
(Gross tons)

Division	1951/2	1952/3	1953/4
Automotive*	299,747	264,622	289,983
Engineering and jobbing*	1,713,984	1,525,455	1,433,046
Building and domestic	547,189	527,079	558,169
Cast iron pipes...	596,108	659,055	697,143
Ingot molds	317,985	349,555	367,058
Railway equipment	344,204	332,295	324,824
Total	**3,819,217**	**3,653,061**	**3,670,223**
Malleable only ..	146,140	140,024	134,066

*Tractor castings are included under Engineering heading to make series comparable.

During the year, the iron foundry labor force fell to 139,002 workers, the first time it has been below 140,000 since 1947. In the past couple of years, the labor force has fallen by considerably more than output, reflecting a higher productivity per man-year.

At the annual banquet, attended by 500 persons, the principal guest was Lord Layton, chairman, Consultative Assembly of the Council of Europe, who spoke in favor of some form of association between the British iron and steel industry and the European Coal and Steel Community. Sir Archibald Forbes, chairman, Iron and Steel Board, emphasized the benefits of close cooperation between the board, the industry and its consumers.

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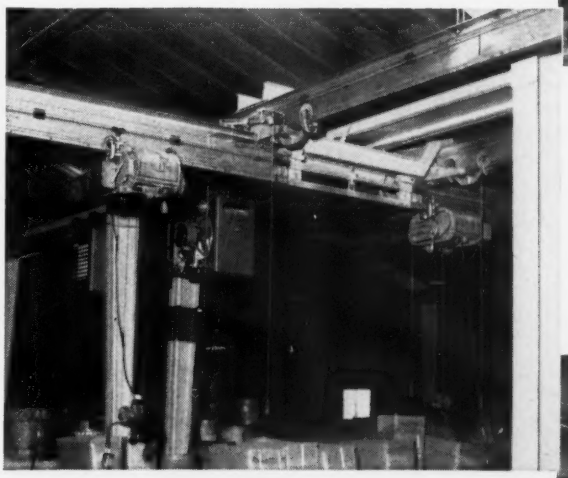
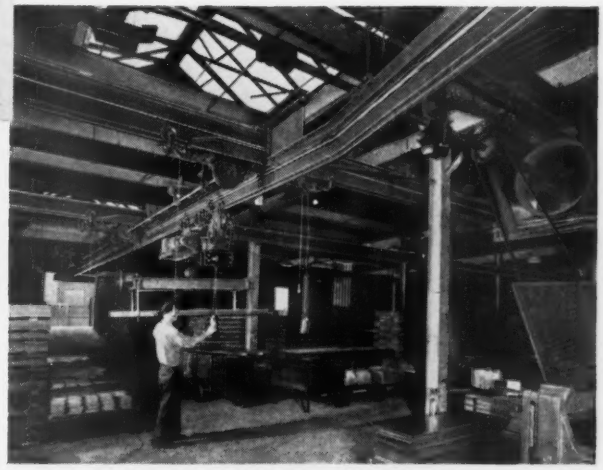
Three-ton hoist hook service extends from craneway to craneway by finger-tip controlled passage of carrier across crossover with cranes interlocked at each end.



One-ton hoist operated from crane bridge to crane bridge interlocked at crossover between craneways.

Three MonoRail cranes are interlocked to form passageway for transfer from receiving dock to steel storage area. Crane in foreground interlocks with spur track to each shear.



To handle variable loads over maximum areas, MonoRail Cranes offer smooth travel, easy movement, interlocking service between and beyond craneways, low initial cost and most important low maintenance cost. American MonoRail engineers are experienced in all phases of "up and over" handling. They are available for free consultation at your convenience.

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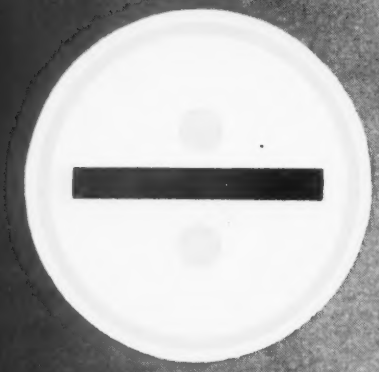

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- **Barker Foundry Supply Co.,** Los Angeles
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- **Frederic B. Stevens, Inc.,** Detroit; Buffalo
- **Pennsylvania Foundry Supply & Sand Co.,** Philadelphia; New York; New England
- **Industrial Foundry Supply Co.,** San Francisco
- **M. A. Bell Co.,** St. Louis; Tulsa; Houston; Denver, Fred McGee, Chattanooga
- **Firebrick Engineers Co.,** Milwaukee
- **Frederic B. Stevens of Canada, Ltd.,** Windsor; Toronto
- **LaGrand Industrial Supply Co.,** Portland, Ore.
- **Foremost Foundry Supply Co.,** Chicago
- **Export Department:** 1010 Schaff Bldg. Philadelphia, Pa.
- **Foundry Supply Co. Inc.,** Minneapolis; St. Paul
- **Canadian Foundry Supplies & Equip. Co., Inc.,** Montreal; E. Maritimes

Apprentice Training

(*Continued from page* 95)

II and III. Nearly every topic lists a number of reference books or other material and a certain number of pages are assigned to study. A companion book to the workbook is issued; it is known as a test-book. This test-book is kept by the instructor and as an apprentice completes the study of a topic, he is issued the test-book to do the test on that topic. Because the class is never too large—from 16 to 25 students—the instructor is able to know what is going on at all times in the room. The tests are short but comprehensive, the number of questions averaging a dozen.

Accommodates Slow Student

As mentioned previously, Workbook I is elementary and was carefully worked out to take care of the very slow students who should be able to complete it in not more than three semesters of school (1½ years). The better educated and more intelligent students could finish more quickly, the completion time depending on their own diligence and ambition. When the first workbook is finished, the student reports to the school coordinator's office where he takes a final examination on all the units of work in the book. This examination has 143 questions and problems.

A passing grade of 70 per cent or better is required. If a passing grade is not made, the test may be taken again after three weeks. Many apprentices take the full 2½ hours allotted to the examination; a few have finished it to their satisfaction in 1½ hours.

Workbook II has these six units: Unit A. "The Molding and Coremaking Apprentice and His Trade," two topics. Unit B. "Foundry Mathematics," ten topics. Unit C. "Patterns," three topics. Unit D. "Molding," six topics. Unit E. "Coremaking," six topics. Unit F. "Metallurgy," nine topics.

Workbook III has seven units, they being: Unit A. "The Foundry Industry," three topics. Unit B. "Blueprint Reading and Shop Sketching," seven topics. Unit C. "Molding," six topics. Unit D. "Coremaking," three topics. Unit E. "Melting," eleven topics. Unit F. "Cleaning," seven topics. Unit G. "Foundry Organization and Layout," nine topics.

Reference books, pamphlets, etc., assigned for study are bought by the schools and form a library which is available to the apprentices in class. This library becomes quite large as there are ten books and eight pamphlets required for the first workbook alone. Parts II and III has films listed for reference and assignments as well as books and pamphlets.

As the apprentices determine the speed at which they work through the books, so too is the decision on which of the units, except Unit A, they wish to study. Although Unit A must be studied first, the other units from B to G may be studied in any order as they do not "tie in" progressively with each other. However, once a unit is started, it must be finished before another may be started.

The question has been asked as to why the first workbook was divided into several units or divisions of foundry work with only a small amount of study spent on each, instead of choosing one and expanding it to encompass all the information necessary to completely cover the subject before going on to another unit.

The explanation of this lies in the fact that the apprentices work in different shops—some in steel or gray iron shops, some in brass or aluminum shops. Some apprentices start their training on core work, some on various branches of molding. It is necessary to subject the beginning apprentice quickly to a broad although elementary knowledge.

All recognize that the apprentice learns the how of the trade on the job. The school amplifies this learning by imparting information or by study assignments within the units which explain the materials, machines and processes used in the trade. Most topics are on the technical approach, and little was done in the way of studying molding problems or molding exercises. Too often the explanation of how to mold a certain job is subject to a half-dozen different ways, all possibly right. Any explanation given will be criticized in some shop when taken back by the apprentice and repeated by him to experienced journeymen. Such conditions are not conducive to complete harmony and satisfaction to instructor, apprentice or shop foreman.

"When are they going to get clocks? I figure it's about twenty silicas after four."

These work and test books have been in use since 1951. Previously, the load on the instructors was great. Most classroom work was by lecture; some by general or group discussion, some by written or oral assignments. Lecture work involved considerable time in preparation, discussion was haphazard and assignments were generally unsatisfactory. Films were utilized whenever possible and field trips were undertaken occasionally. Talks by local foundrymen were encouraged and tests were given afterwards to the students to enforce an interest in them.

Apathy was shown in the beginning when the apprentices were instructed to buy the books and use them. The apprentices were reluctant to begin them not only because of the work in view, but also because of the cost involved. The workbook and test-book pair cost $4. Although the amount was small, every argument and excuse was used before they were finally purchased. In some cases the companies for whom the apprentices worked agreed to reimburse them the cost of the books, as they were highly in favor of this new plan of teaching. Parts II and III also cost $2 the pair, but these are purchased only when the apprentice has progressed to them.

Must Complete Courses

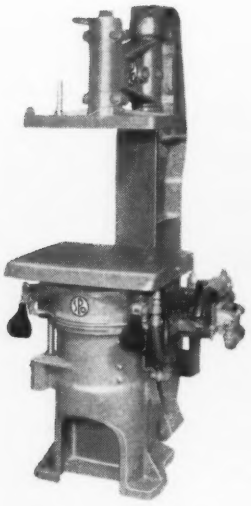
For two years, the stipulation to minimum completion of their trade training besides five hundred hours of class time was a passing grade in Workbook I. Then the joint apprenticeship committee stipulated that Part II should also be completed with a passing grade of 70 per cent or better. It was decided also by this committee that the unit covering mathematics in Part II would be dispensed with.

At the beginning of 1954, the committee ruled that all apprentices now entering the trade would be required to complete satisfactory all three parts of the course in molding and coremaking. It was felt that the five semesters left in the four-year apprenticeship would be sufficient to complete Parts II and III. The first three semesters, it will be remembered, were to be used for Part I.

The evening classes are held during the regular season of secondary school classes and are closed during the three summer months, although this schedule would not have to be adhered to. With the use of this teaching tool, the apprentices could receive instruction at the work site as well as at a school if reference materials were available.

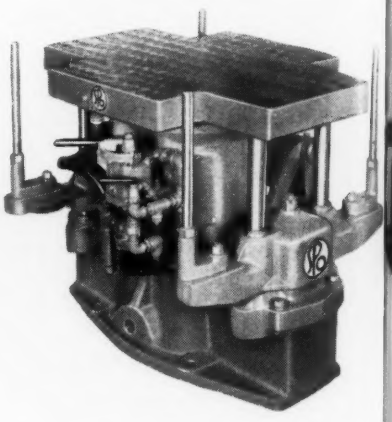
. . . FOR MODERNIZATION

to meet the needs of the *Changing Foundry*



Model 110-P

JOLT-SQUEEZERS . . . for small precision molds. This post-type Model 110-P can be supplied with 10, 13 or 14-inch squeeze cylinders.



Model 3070

JOLT PIN LIFTERS . . . for diversified production operations. SPO Series 3000 units have jolt capacities from 750 to 4000 pounds.

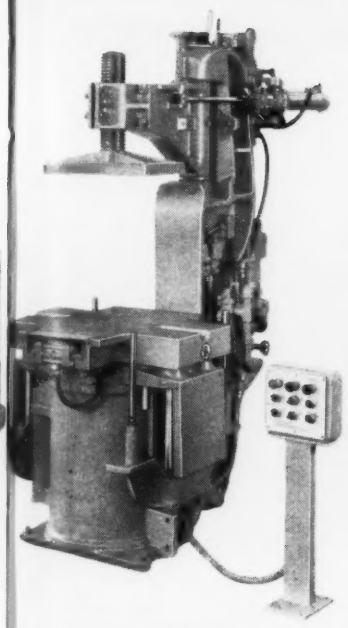
. . . FOR AUTOMATION

SPO is the recognized leader in the development and production of fully-automatic molding machines. A steadily growing backlog for the already famous SPOMATIC speaks for itself. Leading high-production foundries are converting existing plants . . . or creating new facilities . . . to take advantage of the remarkable economies and increased production possible through automation. To meet the diversified needs of these foundries, SPO is developing improved equipment, including a line of smaller machines for foundries that do not require fully-automatic molding units of the SPOMATIC type.

WORLD'S LARGEST SUPPLIERS SPO OF MOLDING MACHINES

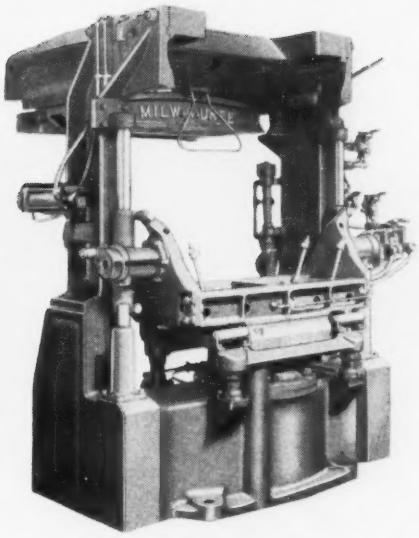
SPO CAN SUPPLY PRECISION

4042-SI



Model 2160-C

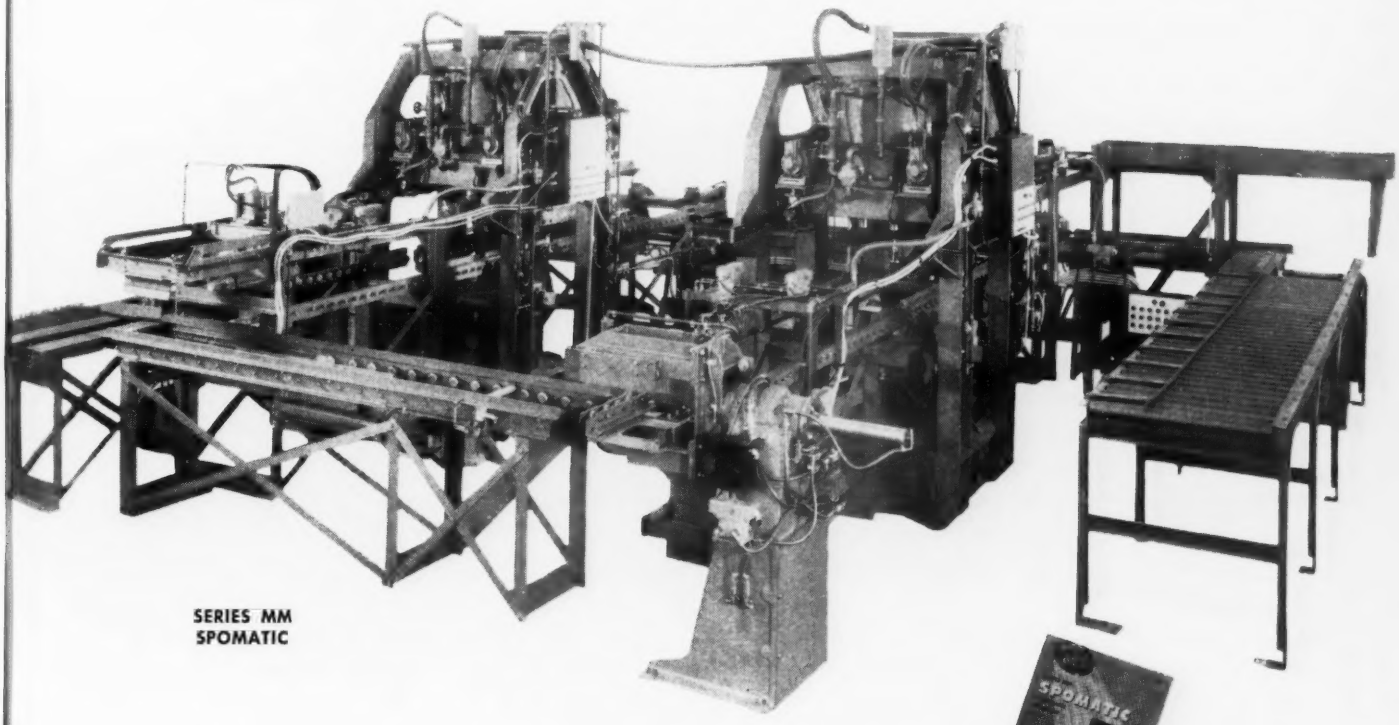
OLT - SQUEEZE - STRIP/DRAW MA-CHINES . . . featuring fully auto-matic controls and pushbutton peration. Available with 13, 14 nd 16-inch squeeze cylinders.



Model 217

JOLT-SQUEEZE-ROLLOVER-DRAW MA-CHINES . . . combine all operations in simplest possible operating cycle for fast production of drag molds. Can be supplied with 16, 21 and 30-inch squeeze pistons.

The importance . . . in fact, the necessity . . . of improving existing facilities is recognized by progressive foundrymen. In spite of the growing popularity of fully-automatic molding operations in large high-production foundries, the jobbing foundry will continue to pour tremendous annual tonnages with semi-automatic and manually operated molding machines. These foundries . . . to stay competitive . . . need machines of improved design that will produce precision molds for years with minimum maintenance and replacement. ONLY SPO has a complete line of performance-proven equipment to meet the needs of every jobbing foundry



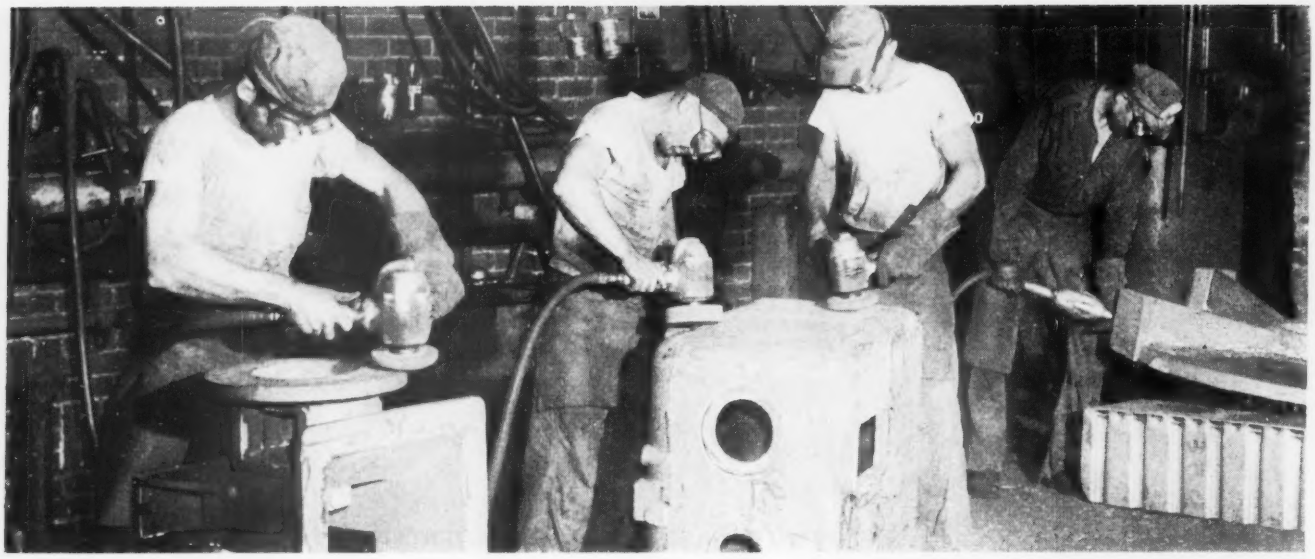
SERIES MM
SPOMATIC

Write Today for Information on the Complete SPO Line

MOLDING MACHINES FOR EVERY JOB

SPO INCORPORATED

6449 GRAND DIVISION AVENUE • CLEVELAND 25, OHIO



Vertical and horizontal portable grinders help speed production in this foundry cleaning room. Note air line oilers and filters in background

Horizontal grinders get into tight spots on castings, turn out finished castings faster

INCENTIVE PLAN in the CLEANING ROOM

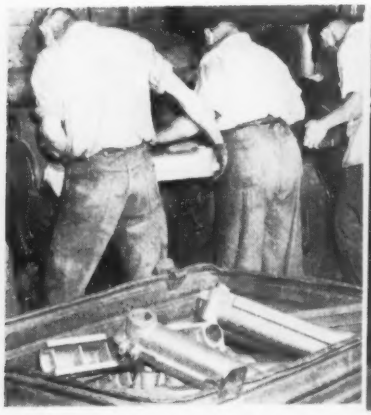
By R. V. SHAFFER
Field Sales Manager
Buckeye Tools Corp., Dayton, O.

LOW productivity, excessive overtime, high labor turnover, slovenly plant housekeeping, lack of understanding between labor and management—these are problems found in varying degree and number in almost any manufacturing plant.

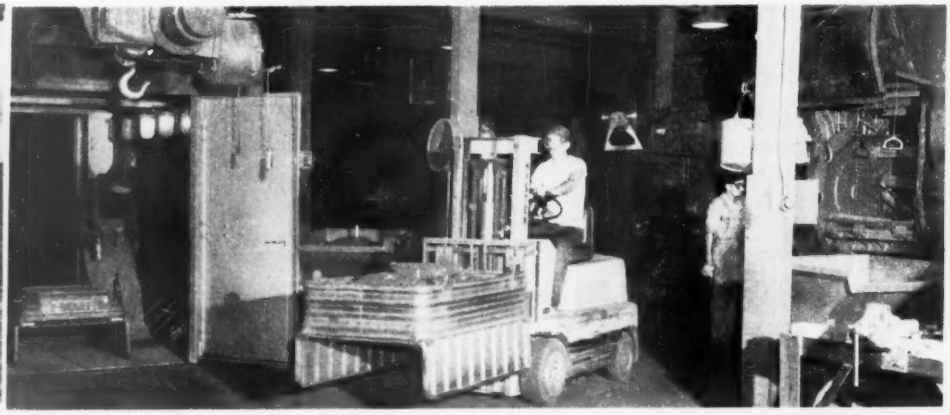
All five of these problems existed in an eastern jobbing foundry, yet not only was a solution found, but an increase in productive output ranging up to 57 per cent a week was achieved at the same time.

Taking the problems singly, a check was made on production and on time records for the castings cleaning department where these problems existed. During a typical 4-week period, the department turned out an average of 203 lb of com-

(Continued on page 170)

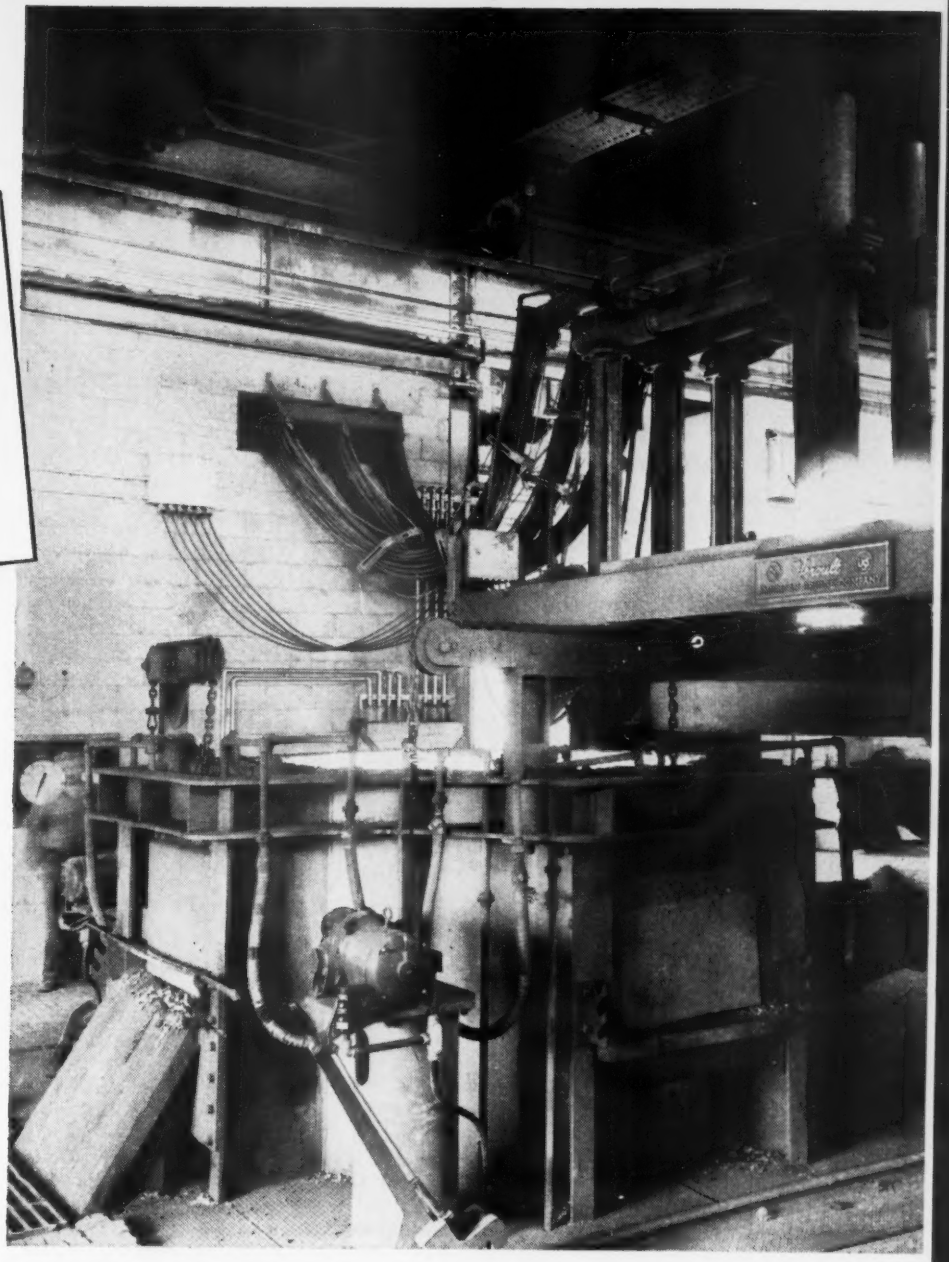


Ventilation improves working conditions and raises efficiency



Mechanized handling speeds cleaning room operations and provides a continuous flow of castings through cabinet-type shot cleaning room at left

Heroult
ELECTRIC MELTING FURNACES



The high production capacity of the Heroult makes it the foundryman's favorite furnace!

NEW CATALOGUE
Now Ready

Contains up-to-date information on Heroult Electric Melting Furnaces – types, sizes, capacities, ratings, etc. For free copy, write to our Pittsburgh office.

AVAILABLE in foundry sizes with either Gantry or swing-type roof, these widely used furnaces are equipped with the latest time- and labor-saving mechanical devices and electrical controls. They are noted for their efficient performance, low operating and maintenance costs.

We welcome an opportunity to help you select and install the foundry furnace best suited to your requirements.

AMERICAN BRIDGE DIVISION, UNITED STATES STEEL CORPORATION
GENERAL OFFICES: 525 WILLIAM PENN PLACE, PITTSBURGH, PA.

Contracting Offices in New York, Philadelphia, Chicago, San Francisco and other principal cities.
United States Steel Export Company, New York

USS

UNITED STATES STEEL

(*Continued from page* 168)
pleted castings and used more than 2900 man-hours, including 985 overtime hours, to do the work. The department operated 13 to 14 hours daily during the week and frequently chalked up 5 to 6 hours additional on weekends.

The proposed solution to these two problems—low production and excessive overtime—was in the establishment of an incentive plan. Under this proposal, each employee in the cleaning room, with the exception of supervisory employees, could earn a bonus of 1 per cent of his regular pay for every increase of 3 lb per man-hour above the 203 lb average. Thus, by increasing the average from 203 to 233 lb, each employee in the group would earn a 10 per cent bonus.

To maintain fairness, allowances were made for new and inexperienced employees, only a fraction of their time being charged to the over-all total and a corresponding fraction of the bonus being credited.

Intended to solve two problems immediately, and to solve a third problem—high labor turnover—in due time, the plan did not get off to a very good start. For the first three weeks the bonus averaged around 4½ per cent; during the following four weeks the figure dropped to ½-per cent. Part of the trouble was due to the natural disinclination to go along with the new plan; probably even more of the trouble stemmed from the existence of the two remaining problems—poor plant maintenance and lack of understanding between labor and management. Obviously, the solutions to these problems had to come, in the main, from the employees themselves.

As the plan continued and employees learned their earnings were limited only by their own efforts, attention was focused on the need for greater efficiency in the cleaning room. Suggestions were eventually offered by employees, as anticipated. Some dealt with ventilation, others with mechanical handling, still others with better tools and improved tool maintenance. Until the advent of the incentive plan, employees had exhibited little or no interest in the production equipment with which they worked. Once it became obvious that old, worn tools and antiquated methods were handicapping their efforts to earn larger bonuses, the employees' attitude was reversed completely. As suggestions were advanced and accepted by management, the old lack of understanding began to disappear. In addition, employees instinctively improved housekeeping, since such improvements enchanced their abilities to earn the bonuses.

New Tools More Efficient

A check of the tools being used in the cleaning room revealed that at least 17 of 30 tools were slated for replacement. Because of the greater efficiency and cutting power of modern air tools, only 12 tools were required to replace the 17 obsolete tools. The 12 included three chipping hammers and nine Buckeye vertical and horizontal grinders. With these additional tools, there was sufficient equipment to permit the establishment of a permanent preventive maintenance program. Now certain tools can be removed from service for periodic checkup without hampering any of the production operations.

With all five problems solved, the average bonus, which ran between 8 and 9 per cent for the first few months the plan was in operation, has soared to 35 to 47 per cent, with attendant increases in productive output. The incentive plan, sound

(*Concluded on page* 172)

Need core plates that SPEED PRODUCTION?

. . . then use TRANSITE CORE PLATES that are light-weight and easy to handle

You'll find two important reasons why Transite* Core Plates mean faster production: First, core makers can handle more plates with fewer trips. Second, Transite Core Plates are easier to clean . . . core wash, sand, etc., do not adhere to them as readily as to other core plate materials.

Here are more *reasons why you can profit by using Transite Core Plates:*

They give long service—Made of tough, fibrous asbestos and cement, Transite Core Plates resist shock and corrosion—will not crack or break easily—require little, if any servicing. *Performance records of 8, 10 and 12 years are not unusual.*

They maintain accuracy — Transite Core Plates stay smooth through long, hard service. Foundrymen who have used them for years report minimum warpage.

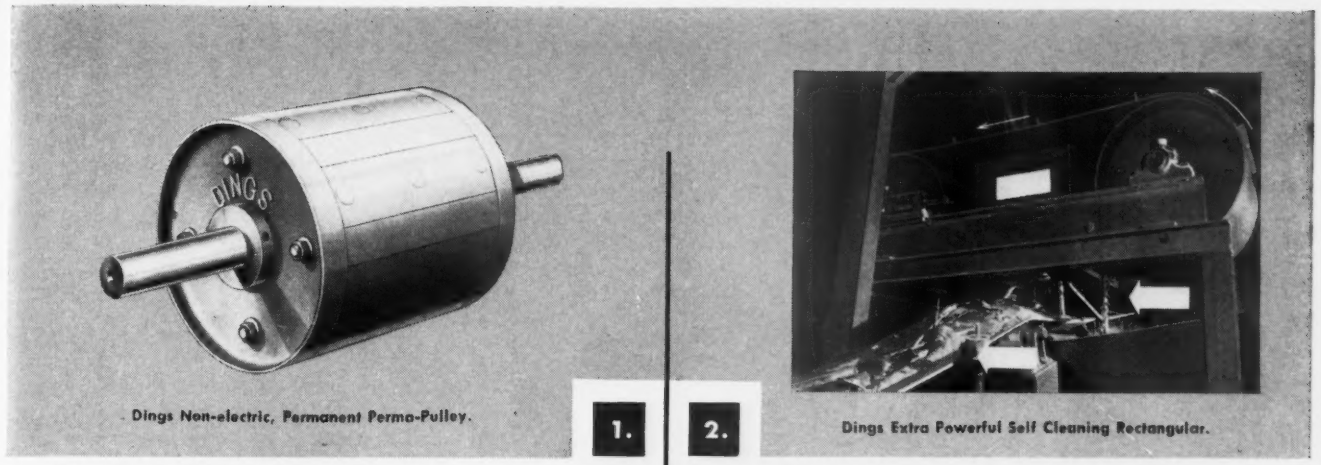
For cores of large mass and small surface area, perforated Transite Core Plates are also available to eliminate green cores and reduce baking time. For full details write Johns-Manville, Box 60, New York 16, N. Y.

JM PRODUCTS

*Reg. U. S. Pat. Off.

Johns-Manville TRANSITE CORE PLATES

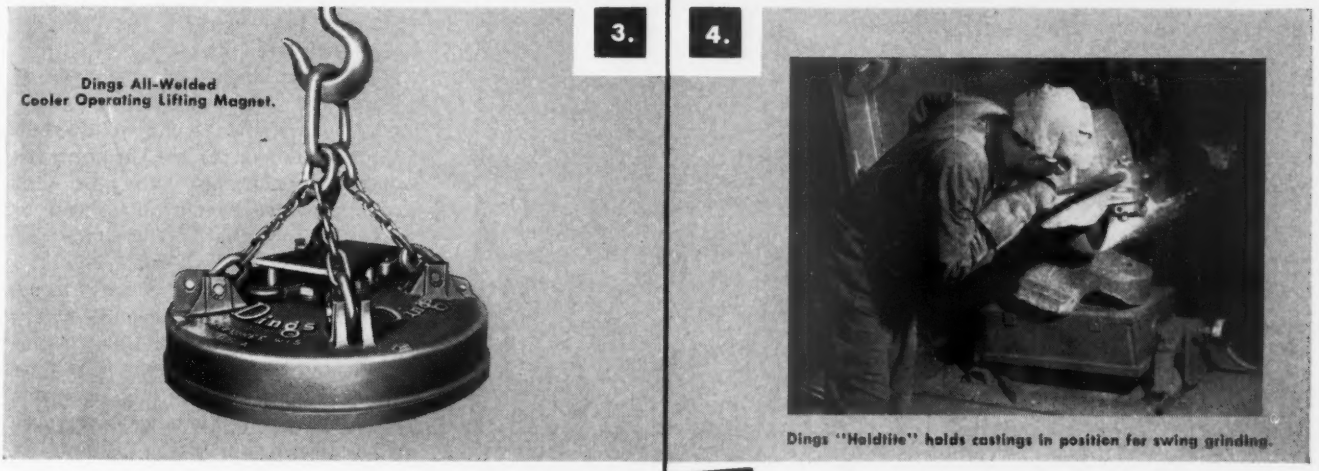
Made of Asbestos



Dings Non-electric, Permanent Perma-Pulley.

Dings Extra Powerful Self Cleaning Rectangular.

1. 2. 3. 4.



Dings All-Welded Cooler Operating Lifting Magnet.

Dings "Holdtite" holds castings in position for swing grinding.

4 WAYS TO CUT HANDLING COSTS

Compare the advantages these Dings magnets offer over your present methods:

1. THE NON-ELECTRIC, PERMANENT PERMA-PULLEY in the sand handling system takes iron out automatically, without attention, without electricity, without maintenance. Perma-Pulleys have no operating expense, are guaranteed to be permanently magnetic. Magnetic strength is certified.

2. THE SELF CLEANING RECTANGULAR FOR THE TOUGHEST JOBS . . . *another sand handling cost-cutter.* Great power enables this magnet to handle particularly difficult iron extraction jobs. For *maximum* iron removal, none can surpass the Dings Rectangular. Self-cleaning feature makes operation automatic—eliminates "carry-over" of sand with iron.

3. LIFTING MAGNET LIFTS 10 TO 100% MORE. Ideal for handling scrap, pig iron, castings, metal flasks, etc. Lifts more because it's cooler operating. All welded, lightweight, moisture-proof, rugged, 4-point chain suspension.

4. "HOLD-TITE" CUTS GRINDING LABOR COSTS UP TO 25%. Firmly holds all shapes of castings up to 1000 lbs. in position for swing grinding. Magnet can be tilted to 7 different positions. Requires practically no maintenance, simple to install. SEND FOR THIS PAPER: *"Lowering Cleaning Room Costs Through Use of Magnetic Chucks"*. Use coupon below.

If you can use the advantages these magnets offer, NOW is the time to act. Deliveries are still better than average.

Dings

DINGS MAGNETIC SEPARATOR CO.
4708 W. Electric Ave., Milwaukee 46, Wisconsin

SEND THIS COUPON
OR DROP A POSTCARD

Dings: Send me Catalog containing full information on

☐ PERMA-PULLEY ☐ LIFTING MAGNET
☐ RECTANGULAR ☐ "HOLD-TITE" plus

Article on "Lowering cleaning room costs through the use of magnetic chucks"

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For the vital links in your AUTOMATION PLANS

call in STANDARD conveyor

Up-to-the-minute conveyor planning between automatic machines and control points is essential to gain the full benefits of automation. Your needs in conveyors — ranging from engineered systems of power and gravity types to single units — can be met by Standard. Nearly 50 years of "package" conveyor application experience is available to you. Our engineers can choose from roller, belt, slat, chain, wheel, push-bar conveyors, spiral chutes and pneumatic tube systems, plus special portable types.

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HANDIPILER • LEVEL BELT • LITEWATE • HANDIDRIVE
PNEUMATIC TUBE SYSTEMS

(*Concluded from page* 170)

as it was, could not succeed until all problems had been solved.

With the incentive plan now firmly established as part of the cleaning room operation, this plant has virtually eliminated excessive overtime, has increased productive output and little or no labor turnover exists. In addition, plant housekeeping practices have improved noticeably and there now is a mutually satisfactory understanding between management and labor.

Accurate records kept on operations in the cleaning room since the adoption of the incentive plan and the many suggestions offered to management have proved the value of the equipment which has been installed in recent months. An exhaust system for core knockout, swing grinder and portable air tool grinding stations has resulted in improved working conditions. The fork lift truck provides a continuous flow of castings through the cabinet-type shot cleaning room and has eliminated the time and energy losses common to the hand-pull trucks formerly used. Installation of line oilers and filters on the air lines has resulted in better tool operation and less tool maintenance, as proved by the records.

The use of a pressure gage provides a quick, accurate check of the air tool operating efficiency. The combination of modern air tools, modern air line equipment and a sound preventive maintenance program not only reduces tool maintenance, but permits the full realization of the potentials of the incentive plan.

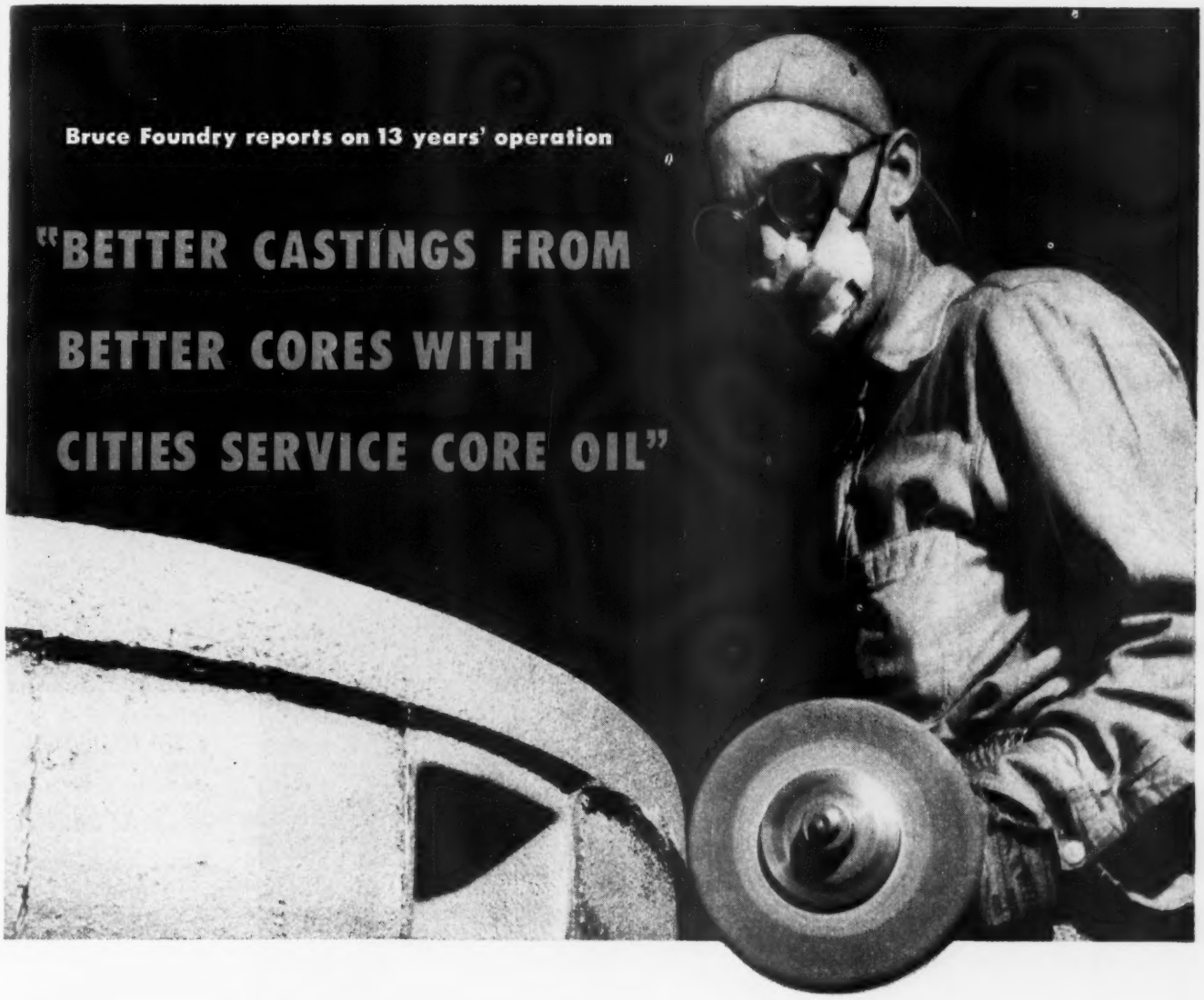
Molders and Coremakers Studied by Government

Training, work experience, personal characteristics and mobility of hand molders and coremakers are reported in a study by the Bureau of Labor Statistics, Department of Labor. Evaluation of the findings are made in terms of their significance for manpower planning in a mobilization period. A low rate of job changing was found despite the fact that those workers who did change jobs were able to shift freely among the various types of foundries.

Molders and coremakers were found to be older than other skilled workers. Complete results of the study are found in bulletin 1162, which is for sale, 60 cents a copy, by the Superintendent of Documents, U. S. Government Printing Office, Washington 25.

Bruce Foundry reports on 13 years' operation

"BETTER CASTINGS FROM BETTER CORES WITH CITIES SERVICE CORE OIL"



PRESIDENT WILLIAM J. BRUCE is high in praise for Cities Service Core Oil. Says it prevents premature collapsing, eliminates sticking, permits minimum smoke and offers absolute uniformity. Great in every respect.

Located in Tecumseh, Michigan, Bruce Foundry and Mfg. Co. has a melting capacity of 30 to 40 tons per day. For many years Bruce has turned out top-notch castings for refrigeration and automotive hydraulic equipment.

And for thirteen of those years, Cities Service Core Oil has been a major factor in the quality and rapidity of Bruce's work. Probably no one is better qualified to comment on this oil than President William J. Bruce. Here's what he says: "One of the biggest reasons I can think of for recommending Cities Service Core Oil is its absolute uniformity. This we have discovered in every single order for 13 years. As for foundry performance, I don't think there's a better oil. It has high hot strength preventing premature collapsing, yet collapses rapidly at the right time so that sand doesn't have to be dug out of castings. In addition, it eliminates sticking and permits minimum smoke."

If you'd like to learn more about the oil Mr. Bruce praises so highly, talk to a Cities Service Lubrication Engineer. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

CITIES SERVICE

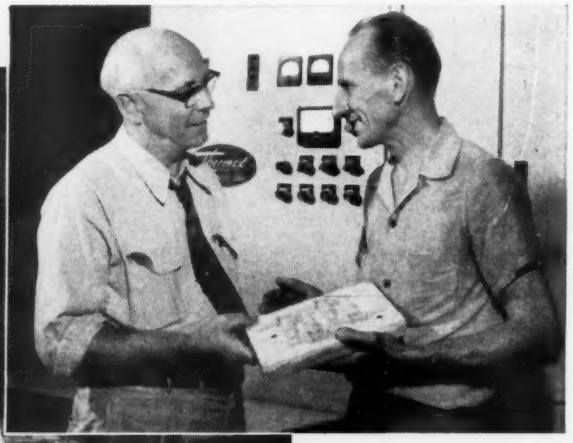
QUALITY PETROLEUM PRODUCTS

AFTER REMOVAL FROM CORE BOX, sand core gets attention from skilled technician at Bruce Foundry. Firm makes castings for automotive and refrigeration hydraulic equipment, has used Cities Service Core Oil for 13 years.

Thermex
ELECTRONIC CORE-BAKING EQUIPMENT

Boosts output from 1600 to 4500 cores per shift

Estimated savings: $10,000 yearly



● *Earl N. Steel (left), Foundry Superintendent and George Forkey, Core Room Foreman, are pleased with the results.*

● *Loading end of* THERMEX *Core Baker. Conveyor extends 20 ft. to allow core makers to load from their stations.*

ACCORDING to Mr. F. V. Cowing, Vice President in Charge of Production, Repcal Brass Manufacturing Company, Los Angeles, replacement of conventional ovens with a THERMEX* Core Baker has given these results in the manufacture of their plumbing brass goods:

LOWER COSTS. Now produces more cores with *one* shift than formerly with *two* shifts. Ratio of helpers to core makers being cut from 3:1 to 1½:1. Estimated yearly savings: $10,000.

CONTINUOUS FLOW. Fast turnover of core plates enables them to produce 4500 cores continuously per shift with only 35 wood waste driers; where 400 driers were formerly required for 1600 cores per shift.

BETTER QUALITY. Smooth surfaces and perfectly uniform dimensions are obtained, core after core, day after day.

IMPROVED WORKING CONDITIONS. Cooler. No smoke.

Find out how *you* can get startling savings and quality improvements with THERMEX Core Baking Equipment. Call or write The Girdler Company, Thermex Division, Louisville 1, Kentucky.

*THERMEX—Trade Mark Reg. U. S. Pat. Off.

the GIRDLER Company

A DIVISION OF NATIONAL CYLINDER GAS COMPANY

THERMEX DIVISION

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This page has been provided for your convenience. Use one of the return cards attached for *more information* on advertisements in this issue.

FURTHER INFORMATION on any of the advertisements in this issue may be obtained by circling the page numbers of advertisements on one of the attached cards. Fill in your name and address, return your card to us—we'll forward your requests to the companies concerned. Further information on their advertisement will come direct to you from the advertiser. *Note: where more than one advertisement appears on a page, the following code is used for identification:* R (right); L (left); T (top); B (bottom); 1-2-3-4 (in order from top to bottom); IFC (inside front cover); IBC (inside back cover); OBC (outside back cover).

● For further information on helpful literature, trade publications, and new equipment descriptions, please refer to IDEAS FOR FOUNDRYMEN insert and return cards on page 209.

FOUNDRY Readers Service

FEBRUARY 1955

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1	28-29	59	119	155	190	218B	244B	257L1
2	30	60	121	156-7	191	219	245L	257L2
4-5	31	61	122	159	192	220	245R	257L3
6	32	62	124-5	161	195	221	247	257R
7	35	63	127	163	197	223	248L	258TL
8	36	64-65	129	164	198	224	248R	258BL
9	37	66	131	166-7	199	226-7	249	258R1
10	38-39	67	132	169	200	229	250T	258R2
11	40-41	68	133	170	201	230	250B	258R3
12	42	69	134	171	202	231	251T	258R4
13	43	70	135	172	203	233	251B	259TL
14	44	71	137	173	204T	235	252T	259BL
15	45	72	138	174	204B	236	252B	259R
16-17	46-47	73	139	177	205	238T	253BL	260T
18	48	74	141	179	208	238B	253T	270L
19	49	75	142	180	211	239L	255TL	270TR
20-21	50-51	76	145	182-3	213	239R	255BL	270BR
22	52	109	147	185	214	241	255R	273R
23	53	111	148	186	215	242L	256T	274
24	54	113	149	187	216	242R	256BL	IBC
25	55	115	150-1	188	217	243	256BR1	OBC
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IFC	27	58	116	154	189	218T	244T	256BR3
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2	30	60	121	156-7	191	219	245L	257L2
4-5	31	61	122	159	192	220	245R	257L3
6	32	62	124-5	161	195	221	247	257R
7	35	63	127	163	197	223	248L	258TL
8	36	64-65	129	164	198	224	248R	258BL
9	37	66	131	166-7	199	226-7	249	258R1
10	38-39	67	132	169	200	229	250T	258R2
11	40-41	68	133	170	201	230	250B	258R3
12	42	69	134	171	202	231	251T	258R4
13	43	70	135	172	203	233	251B	259TL
14	44	71	137	173	204T	235	252T	259BL
15	45	72	138	174	204B	236	252B	259R
16-17	46-47	73	139	177	205	238T	253BL	260T
18	48	74	141	179	208	238B	253T	270L
19	49	75	142	180	211	239L	255TL	270TR
20-21	50-51	76	145	182-3	213	239R	255BL	270BR
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FURTHER INFORMATION on any of the advertisements in this issue may be obtained by circling the page numbers of advertisements on one of the attached cards. Fill in your name and address, return your card to us—we'll forward your requests to the companies concerned. Further information on their advertisement will come direct to you from the advertiser. *Note: where more than one advertisement appears on a page, the following code is used for identification:* R (right); L (left); T (top); B (bottom); 1-2-3-4 (in order from top to bottom); IFC (inside front cover); IBC (inside back cover); OBC (outside back cover).

● For further information on helpful literature, trade publications, and new equipment descriptions, please refer to IDEAS FOR FOUNDRYMEN insert and return cards on page 209.

FOUNDRY Readers Service

NATIONAL PITCH-RESERVOIR NIPPLES*

TRADE-MARK

THE NEW PITCH-RESERVOIR NIPPLE, an exclusive "National" product, is another major contribution by National Carbon Company to more efficient electric furnace operation. You can now be sure that tight joints will stay tight under normal load and service conditions.

"NATIONAL" PITCH-RESERVOIR NIPPLES, designated Type PR-F, are now available for electrode diameters from 14" to 24". Thoroughly proved in service, they are identical in strength, size, shape, tolerances, composition and quality to our standard, tapered, graphite nipples. Talk it over soon with your National Carbon Company electrode representative.

***PATENTS PENDING**
EXCLUSIVE DESIGN

HERE'S HOW IT WORKS:

Reservoirs near each end of the nipple contain pitch. As the electrode column becomes hot in service, the pitch flows from the reservoirs into the threaded sections of the joint and cokes out, cementing and locking the threads of the nipple and sockets together.

FOR ELECTRODES AND ELECTRODE SERVICE...
Rely on NATIONAL CARBON COMPANY!

The term "National" is a registered trade-mark of Union Carbide and Carbon Corporation

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A Division of Union Carbide and Carbon Corporation
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Sales Offices: Atlanta, Chicago, Dallas, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco. *In Canada:* Union Carbide Canada Limited, Toronto

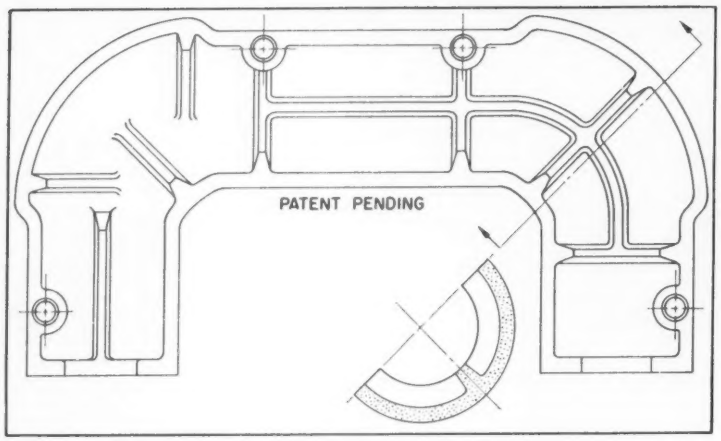


Fig. 1—A half-shell core for a 2-in., 90-degree screwed elbow. Dowels match core halves

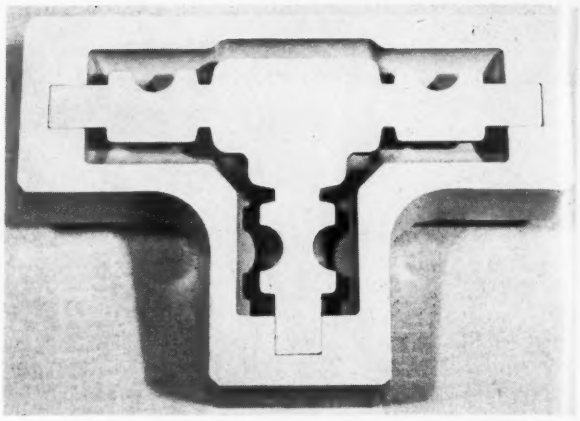


Fig. 2—Master pattern for 2-in. Tee is made of cast plaster of Paris made from core stick

Producing Shell Cores
On a Production Basis

By FRANZ SCHUMACHER
Chief Patternmaker
Cooper Alloy Corp.
Hillside, N. J.

THE problem of making castings by the shell mold process has received prominent attention and wide discussion in foundry circles. Although the process has been proved highly successful, it still is undergoing experimentation and development.

To date, most of the significant improvements have been concerned with molds for forming the exterior of castings. As a result, the problems involved with making shell cores have been relegated to the background; furthermore, these problems appear more complex than those of making the mold. Too many shell mold castings with excellent exterior properties are scrapped because of cracks, penetrations, roughness and other defects caused by cores.

When molten metal is poured into a mold containing a core, the binders vaporize, creating a considerable amount of gas, and minute voids between the sand grains afford partial passage for the escaping gas. If the core is not properly vented to allow excess gaseous products to escape, an undesirable roughening results on the metal surfaces adjacent to the core. A core must be durable enough to withstand the erosion and pressure applied on it by hot metal, yet must collapse soon after the metal has begun to solidify. A core which does not react in this manner may prevent the cooling metal from contracting. Then the casting will crack. Removal of a troublesome sand core, still solid within the body of the finished casting, can waste considerable time and labor.

With conventional cores—solid bodies of sand—only a fraction of the material actively participates in the casting process. The outer surfaces of the dense core, from a depth of ¼ to ¾-in., effect core forming; the material beneath serves only to add rigidity. A core consisting of a thin shell of strongly bonded sand would have the following advantages:

1. Baking time and temperature would be reduced since the volume of materials being baked would be lessened. Thermal conductivity of a shell core would be higher, producing more uniform baking.

2. Less sand would be used, lessening costs.

3. Lighter cores would handle easier.

4. Shell cores would improve castings. Since less material would be used, less gas would be produced. Escape would be facilitated through the extremely porous shell core and its opening through the ends of the

(*Concluded on page* 181)

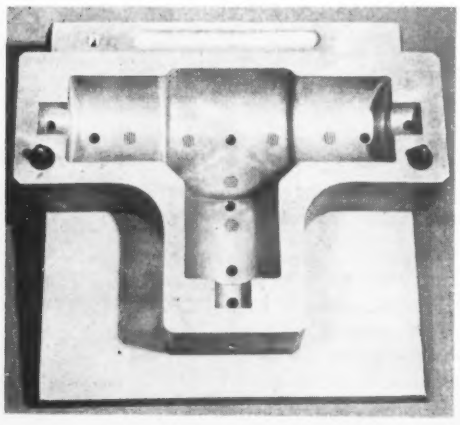
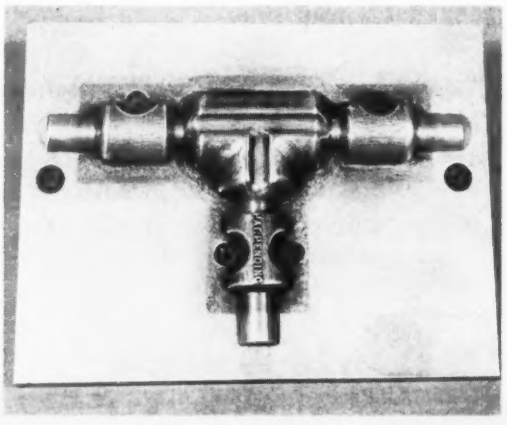
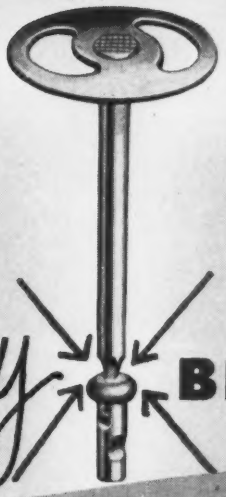


Fig. 3 (left) — Section of shell core-blow box is made to blow shell cores with core sands of a conventional type

Fig. 4 (right) — Drier plate and the mandrel which shapes inside of shell core and controls thickness of the walls



New 4 way BREAKOFF NICK



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saves *time* and *money*...improves castings

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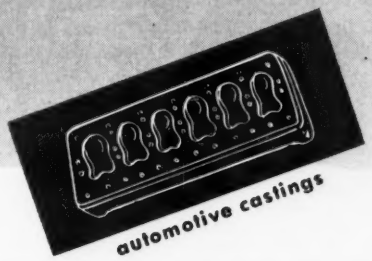
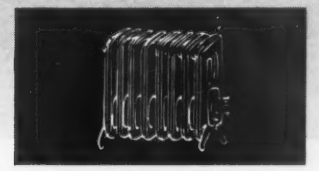
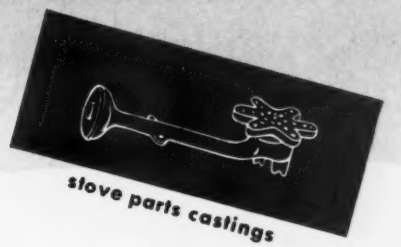


automotive castings



radiator castings



stove parts castings

EXCLUSIVE *New* 4-WAY BREAKOFF NICK

Provides maximum support during pouring, yet stem breaks off easily in any direction so that few remaining after shake-out can be easily brushed off with no apparent surface marks remaining.

STAGGERED KNITTING NICKS

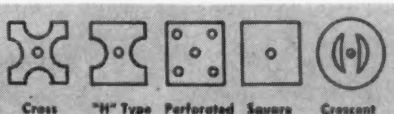
Provide better type of surface for knitting with molten metal, assuring thorough fusion and resulting in clean, solid castings.

A small change in design can often result in large savings in production. The new 4-way breakoff nick on fine FANNER Shoulder Radiator Chaplets is a typical example of the constant study given to casting methods by FANNER engineers. This small but highly important feature, in addition to the other exclusive advantages offered by FANNER Radiator Chaplets, speeds the production of clean, sound castings...help cut labor costs.

Fine FANNER Radiator Chaplets are especially suitable for light pressure castings such as gas burners, radiator sections and manifolds. Designed for use with the side of largest bearing area against green sand, they will support approximately 5 pounds per square inch load.

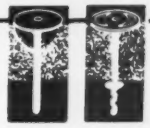
Get complete information on fine FANNER chaplets for all requirements by writing for FANNER Chaplet catalog today!

OTHER TYPES OF FINE FANNER SHOULDER RADIATOR CHAPLETS



Cross Head | "H" Type Head | Perforated Head | Square Head | Crescent Head

NO HAND TUCKING



The special FANNER "open head" eliminates need for hand "tucking" and permits jolt and squeezer machines to pack sand solidly (as shown) along *entire* stem.

STURDY SHOULDER AND SOLID RIVETED HEAD

Shoulder is designed and placed to permit chaplet to be set into pattern required distance without guesswork. Solid riveted head exactly at right angles to stem to insure that chaplet is always perfectly "true".

THE FANNER MANUFACTURING CO.

Designers and Manufacturers of Fine Fanner Chaplets and Chills

BROOKSIDE PARK CLEVELAND 9, OHIO

IS IT WORTH THE TIME AND TROUBLE TO "ROLL YOUR OWN"?

YOU CAN MAKE a mix to line your ladles and furnaces, and get passable results. But can you really prove that "rolling your own" beats the economy, convenience and sure performance of a custom-made refractory? Troubles like scrap loss, furnace repairs and poor metal always cost more than sensible precaution. That's why more and more malleable iron ladles, acid electric furnaces and ladles handling electric furnace steel are lined with

IRONTON CARO-LINE

a custom-made refractory for malleable shops and electric steel foundries. All you do is add water and use . . . nothing simpler for your men. Line anything from a small hand ladle to a large electric furnace with *IRONTON* CARO-LINE.

CHECK UP on your material costs, labor costs, and grief from poor refractory mixes . . . and see if it wouldn't cost less to use *IRONTON* CARO-LINE. Foundrymen from Massachusetts to Oregon and Texas to Montreal are happier with CARO-LINE. Order a get-acquainted shipment today.

MONEY-SAVERS for FOUNDRIES

***IRONTON* BERLITE**
Special purpose Super-duty refractory lining material.

***IRONTON* NOJOINT**
High Duty plastic for furnace linings and all-around foundry use.

***IRONTON* RAVENITE**
New black plastic with "non-wetting" feature, for ladles, cupola, etc.

***IRONTON* CARO-LINE**
Siliceous lining for acid electric furnaces, bessemers, and ladles.

***IRONTON* DO-RITE**
Super Duty plastic for extra slag resistance in hard service.

***IRONTON* SPECIALTIES FOR CUPOLA OPERATION**
Slag hole blocks, tap holes, cupola spout brick, etc.

GRANULAR LADLE COVER
The new "shovel on" top insulation for holding heat in all ladles.

***IRONTON* FIRE BRICK**
A best buy in any grade; made from Kentucky flint and semi-flint clays.

THE IRONTON FIRE BRICK COMPANY
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Want the Ironton office direct? Phone Ironton 109, or 110

(*Concluded from page* 178)
core prints.

5. Shell cores would be resistant to the eroding and penetrating action of the molten metal, yet would not hinder contraction; their structure would be decomposed effectively by heat.

6. There would be no difficulty in shaking out the finely crumbled sand from finished castings.

7. Castings would not crack.

The possibility of manufacturing shell cores on a production basis has occupied the writer's attention for several years. Equipment of relative simplicity finally has been perfected that can mass produce shell cores with greater precision and less cost than conventional apparatus.

During the period of research and experimentation, several critical obstacles to quantity production were overcome. The current process—pouring or blowing sand into a hot corebox and shaking or blowing out the finished core—offers little opportunity for mass production. Moreover, this process precludes the manufacture of many types of shell cores. A speedier, more efficient and less limiting method was sought.

Mandrels Control Thickness

A system was devised which employs mandrels to control wall thickness, inside dimensions and the shape of the shell core. This new method satisfactorily supplanted the slower and more cumbersome process. An outstanding feature of the development permits blowing hollow cores in gang coreboxes that can be installed on today's standard core blow machines. Present core-blowing equipment can be converted readily into shell core blow instruments.

It also has been established that the new equipment, originally intended for shell core blowing with conventional core sand, can be applied to shell coremaking according to the principles of the shell molding process. The installation of heating cartridges permits this adaptation.

Fig. 1 shows a half-shell core for a 2-in., 90-degree screwed elbow. Two male and two female dowels accurately match the core halves. Reinforcements for the bases of the dowels are in the core print section. To eliminate core gas and maintain precise core thickness, pasting should be avoided. Pasting is permissible to fasten the dowels for the core setting.

A novel feature is the reinforced ribs inside the core. Rib proportions are exaggerated to demonstrate their potential for strengthening and reinforcement. Rib size may be tele-

Fig. 5—A full core is made of halves. Dowels are arranged to match them precisely so that either half fits the other one

scoped to accommodate heavy sections of the casting, and they also serve as chills. Wall thickness of each core is determined by the overall size of the core. Metal chills can be inserted inside the core for internal cooling.

Fig. 2 illustrates a master pattern for a 2-in. Tee. The pattern is of

Fig. 6—Inside view of core half

cast plaster of Paris made from a core stick (dummy core). The mandrel pattern, controlling the wall thickness, is of wood.

The section of the shell core-blow box in Fig. 3 is designed to blow shell cores with conventional core sands. Note the vented core-blow box. Drilled holes in the sections holding the mandrels serve as nonclogging vents that eliminate the need for special venting.

The drier plate and the mandrel which shapes the inside of the shell core and controls wall thickness are shown in Fig. 4. The dowels, precisely matching the two core halves, are arranged to permit either core half to fit the other. Fig. 5 illustrates a full core made by this process, and Fig. 6 is an inside view of a core half.

This type of shell core is designed not only for shell molds, but for core and green sand molds too. The shell core exhibits the same advantages in either process. In addition to bettering foundry practice, this new development can substantially reduce costs in pattern shops which have been unable to produce a satisfactory core drier. The need for costly master patterns for driers is eliminated. The drier utilized in this new system consists of a straight plate and mandrel. See Fig. 2.

Precision is demanded only in positioning the male and female dowels which match the core halves this is done with an accurately machined template (drilling plate). To manufacture the core-blow box which shapes the outside of the core, only a dummy core need be made. A plaster of Paris master is cast to provide for the master pattern of the blow box.

The mandrel requires only one master pattern because it can be duplicated conveniently in plaster of Paris. The duplicates then should be mounted on a board and cast in aluminum to obtain true reproductions. Since mandrels produce only the inside of shell cores, their castings require little finishing before they are mounted on drier plates.

Foundry Congress To Meet In London, June 19-25

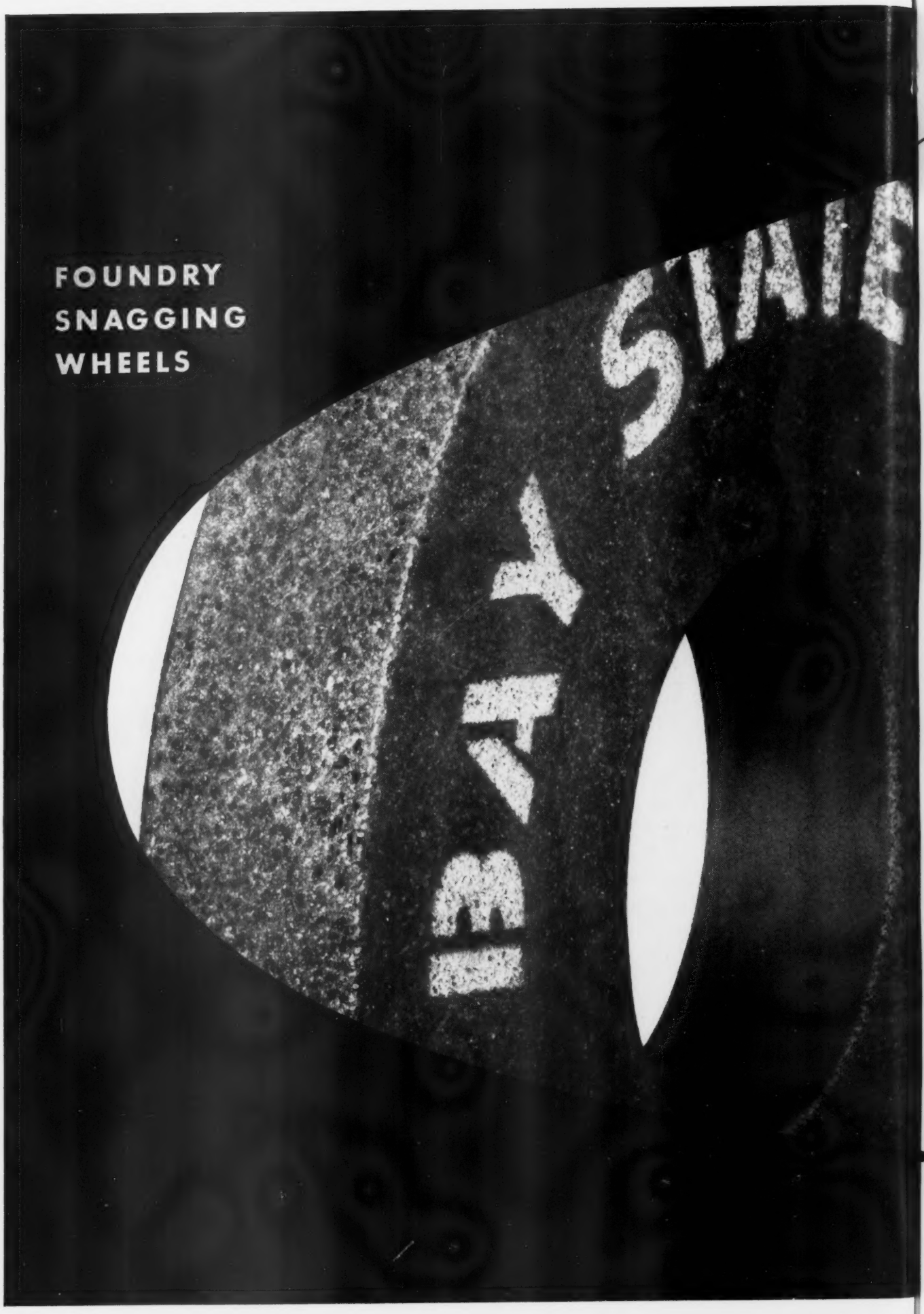
The 22nd International Foundry Congress, organized by the Institute of British Foundrymen, and under the auspices of the International Committee of Foundry Technical Trade Associations, will be held in London, June 19-25, with a choice of two post-congress tours to follow until July 1. In addition to a full week of technical sessions, an extensive social program has been planned, with many special arrangements made for the ladies.

Official business and technical sessions and major social events are scheduled for the opening week in London. For the second week, two post-congress tours have been organized. One visits Birmingham, Leicester, Derby and Manchester and is planned for those interested in quantity production of lighter types of castings. Second tour visits Scotland, the North East Coast, and Sheffield.

Over 40 foundries in the London area will open their doors to visitations.

Dorchester Hotel, Park Lane, has been selected as Congress headquarters. Official registration, opening and closing ceremonies, technical sessions and the official congress banquet will be held in the Dorchester. Official program has not been announced but will be released in March.

Official travel agents for the Congress are Cook/Wagons-Lits-World Travel Service.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For today's high-speed snagging, BAY STATE "builds" wheels with *both* extra cutting rate and safety!

These are "WHEELS of PROGRESS" for *your* foundry grinding, with unequalled uniformity, and specifically engineered for foundry use.

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Basic Cupola Operation

(*Continued from page* 91)

to make no attempt to dry the lining with a torch. If a torch is used and then removed, the lining will hydrate and crumble shortly. This is also true of the slag well and dam. If they are built and are not to be used for a period of two or three days, they should also be allowed to air dry and the torch or charcoal fire applied only a short time before the cupola is operated. If possible it is best to repair the cupola lining just a few hours before operations are to begin.

Refractory Gun—Several makes of refractory guns are being used by foundries. Although these various makes are somewhat different in detail, most of them employ the same general principles. All guns usually contain a main hopper which holds the granular gun refractory. The refractory is fed by various methods —air pressure or mechanical drive— from this hopper into a shooting chamber where it is hit by a jet of air under pressure. The velocity of this jet of air is high enough to carry the refractory through a hose to the point of application. This point may be located 30 to 50 feet from the gun proper. The end of the hose is fitted with a water body or shooting nozzle for the purpose of introducing moisture into the refractory stream just prior to the time that the refractory hits the wall being repaired. The operator applying the refractory can control the amount of water at the shooting nozzle to give the best refractory emplacement.

Cupola Operation—Operating a cupola with basic slags may present some minor problems at first, but these can be eliminated shortly by careful control.

The charge for the basic cupola differs from that of the acid cupola principally in the amounts of limestone and steel scrap used. The amount of limestone will vary from 3 to 12 per cent of the metal charge according to the degree of basicity desired. Because of the increased carbon pickup in the basic cupola, steel scrap can be substituted for pig iron in the metal charge in almost any ratio. If high percentages (10 to 12 per cent) of limestone are charged, it is recommended that fluorspar or a similar fluxing agent be used to keep the slags from becoming pasty.

Coke ratios will be almost the same for the basic operation as those used for the acid operation. However, it must be noted that carbon absorbed by the iron is not available for combustion, so allowance must be made in this regard. Due to the cleansing action that basic slags have on the coke as combustion takes place, new surfaces of carbon are exposed more readily and the melting rate of the basic cupola will probably show an increase of 5 to 10 per cent compared with a similar acid operation.

Other differences that will be noted in a basic cupola operation will be the change in the tap temperature and slag appearance. Tap temperature will normally be higher, thus producing a more fluid iron. Even without the added temperature, basic iron will usually be more fluid than acid iron melted at the same temperature with the same carbon equivalent. The reason for this is the higher carbon to silicon ratio generally found in basic melted irons.

Physical appearance of the basic slags differs from that of acid slags; basic slags have a porous, stony structure while acid slags have a smooth glassy structure. In the case of a rear slagging cupola, acid slags tend to be stringy as the slagging operation is about to stop, while basic slags will form individual droplets at this point.

Color can sometimes be used to determine the degree of basicity of slags. However, very small amounts of some components will change the color of slags greatly, making determination of basicity through color difficult. Increasing amounts of FeO, for instance, will change the color of a basic slag from a dull brown to brownish green, to dark green, and finally black. If the slags produced have a dull brown color and a stony, porous structure, they are definitely basic and the cupola is operating under the highly reducing atmosphere which is usually desirable.

More pronounced changes from acid operation will be discovered in the basic operation if the metal and slag produced are chemically analyzed. The metal produced will generally show a higher carbon and a lower sulphur analysis. Silicon loss may be higher in the basic operation and slags will contain a much higher ratio of CaO + MgO to SiO_2 + Al_2O_3. If these are not the results obtained, the operation is not truly basic and the factors that control the above conditions should be checked carefully.

A simple preliminary calculation involving a lime-silica balance of the cupola will indicate the approximate degree of the slag basicity. An example of such a calculation is shown in the table (p. 89). It must be remembered that the calculation at best is only an approximation of slag basicity.

In this example the slag basicity calculation showed the ratio to be only .95. This would indicate that not enough limestone was charged to make the slags basic. To correct this condition, additional limestone should be charged to bring the CaO:SiO_2 ratio up to a 1.2 minimum.

Control Factors—Since desirable metallurgical results are expected and can be attained when basic slags are employed in the cupola, various metallurgical aspects of basic iron functions along with the factors that control them will be discussed.

Carbon Pickup: Carbon pickup in the basic cupola is controlled primarily by the operating temperatures; usually the higher the operating temperature, the greater the carbon pickup. No set rule can be given as to the amount of carbon pickup since relative pickup is greater when the amount of carbon charged is low than when it is high.

Slag basicity also has an effect on carbon pickup. Higher basicity slags will tend to result in higher carbon pickup. Once the carbon content is in the desired range, it can be held there by keeping the cupola operating temperature and the materials charged constant. Variations in carbon analyses of the metal may be the result of one or more of the following:

1. Variation in coke ratio, which in turn affects operating temperatures.
2. Variation in height of coke bed.
3. Variation in carbon analysis of steel scrap charged.

The variation in coke ratio may take place from day to day without the knowledge of the cupola operator if moisture is allowed to come in contact with the coke. There have been instances where coke has absorbed 15 per cent or more water by weight. If charges are made by weight, this

(*Continued on page* 186)

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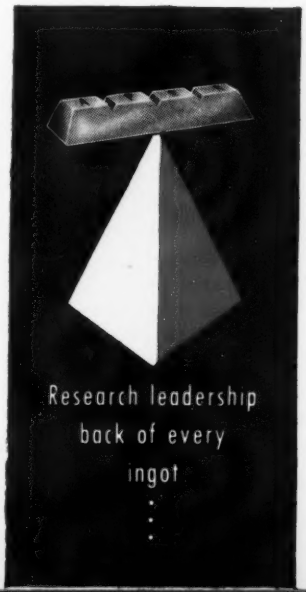

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(*Continued from page* 184)

change in weight due to moisture content would have a material effect on operating temperature.

Temperature will also be affected by a variation in the height of the coke bed. Coke bed height should be maintained by keeping a proper balance between the coke charged and the melting rate.

Large amounts of steel scrap are generally substituted for pig iron when operating with a basic slag system. The carbon content of the steel scrap can vary greatly and in most cases is unknown whereas the carbon content of purchased pig iron is usually known and more constant in analyses.

Silicon Loss: Since oxidized silicon is an acid component, it combines readily with basic slags. This causes a high loss of silicon in the basic process unless the factors involved are controlled carefully. Silicon loss, like carbon pickup, varies with the amount of the element charged. When the silicon content of the charge is comparatively high, the accompanying silicon loss will also be higher than when the silicon content of the charge is low. Thus, it is better to make silicon additions in the ladle instead of the cupola if high silicon irons are desired.

Once silicon (Si) is oxidized to silica (SiO_2), it combines readily with the basic components of the slag. However, silicon loss can be kept at a minimum by keeping the cupola operating temperature high. The higher the operating temperature, the more tendency there is for silicon to be retained in the metal.

Since silicon is lost by being oxidized and combining with the slag, the degree of loss is dependent somewhat on slag basicity; the highly basic slags have more tendency to combine with the silica than the lower basicity slags. It should be noted, however, that this is the second step in the process of losing silicon and that if silicon loss is to be kept at a minimum, the primary consideration should be to keep the operating temperature high and make the silicon additions, if required, in the ladle.

Excessive Lining Erosion—The four principal reasons for wear and damage to any furnace lining are: (1) slag erosion, (2) temperature, (3) abrasion and (4) hydration. Hydration has been discussed previously and abrasion is in most instances a purely mechanical condition. Temperature and slag erosion are related in lining wear since slag erosion will be more severe when operating temperatures are high. If temperature alone is considered, most refractory materials will more than qualify. However, when slag erosion is considered in conjunction with temperature, any refractory lining can be ruined if the acid and base components that make up the slag are not carefully controlled.

One very important item to remember when dealing with slags and refractory linings is that *the slag will attack the lining only if the resulting combination has a lower melting temperature.* Basic refractory linings are only successful when used with basic slags, and acid refractory linings are only successful when used with acid slags. If the operator of a basic-lined cupola does not proportion his charge to obtain a basic slag, he will experience excessive lining erosion since an acid or "lime-hungry" slag will satisfy its wants by attacking the basic lining.

In one instance in which severe lining erosion was encountered, the limestone addition to the charges was more than doubled *without* noticeably changing the total slag volume for the day's operation. This example proves that before the limestone in the charges was increased, the acid

(*Continued on page* 188)

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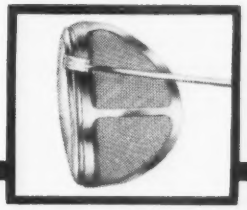

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(*Continued from page* 186)

components in the cupola were combining with the basic lining and producing slag since there was not sufficient limestone in the charge. After the additional limestone was added, the acid components combined with it instead of with the lining, thus greatly reducing lining erosion.

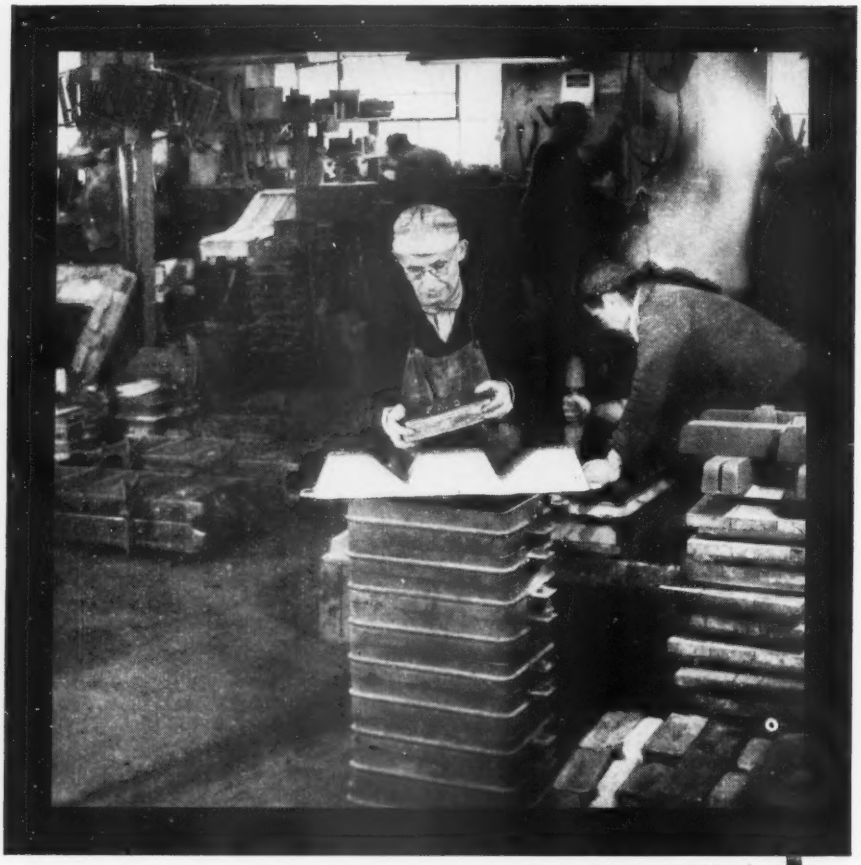
In determining the amount of limestone to be charged, a factor such as the sand coating on return scrap must be taken into consideration. There are also times when scrap from outside storage piles will carry excessive amounts of foreign materials that are usually acid. This is particularly likely to occur on rainy days or when obtaining scrap from the bottom of storage piles where dirt may be picked up with the scrap. Two other forms of contamination that should be avoided are: Washing the cupola walls with acid mixes, and mixing acid materials with the granular mix used for maintenance.

Another cause for lining damage is spalling, due to thermal shock when the cupola bottom is dropped. This happens most often when the backup brick lining is relatively thin, allowing a very rapid temperature drop. Most of the spalling takes place in the brick, but this movement in turn cracks and loosens the monolithic lining. Backup linings should be at least 8 in. thick with 1 in. of insulation located against the shell in order to check the tendency to spall.

The amount of basic lining consumption per ton of iron melted will vary with basic cupola operations to the degree that melting rate, operating temperature, length of run, type of charge, degree of slag basicity and cupola design vary from foundry to foundry. It is usually true, however, that if the basic operation is running smoothly, the lining consumption will be less than that of a similar acid operation. The consumption of refractory per ton of iron melted is generally less in a cupola with a large diameter than in one with a small diameter.

Metal Tap Temperature—Metal tap temperatures are primarily dependent on the coke ratio, the quantity of air blast, and the quality of coke used. If metal tap temperatures are lower than desired, changing the air blast pressure will sometimes raise them. However, it must be remembered that whether the air blast should be increased or decreased in order to get higher temperatures depends entirely on the amount of coke present in the cupola stack. If the coke bed is high, increased blast pressure will raise the metal temperature; but if the coke bed is low, increased blast pressure

(*Concluded on page* 190)



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(*Concluded from page* 188)

will probably further decrease the metal temperature due to a cooling action of the excess air.

Experimenting with a slightly higher or lower blast pressure and checking the resulting metal temperatures with an optical pyrometer will quickly tell the cupola operator whether or not his air blast pressure is correct in relation to the amount of coke being charged. It is important to have these two conditions balanced so that constant temperature and optimum combustion efficiencies can be attained. A constant metal temperature is a prerequisite to smooth cupola operation and to constant metal analyses, since tap temperature directly affects carbon pickup, desulphurization, and silicon loss.

Calcium Carbide Additions—Some basic cupola operators have found that a 1 per cent addition of calcium carbide will raise the metal tap temperatures approximately 75 degrees F. The increase in temperature, together with the increase in slag basicity, probably accounts for the more improved metallurgy obtained.

Just how the calcium carbide functions to give these results is not thoroughly understood. Some operators believe the increase in temperature is caused by the calcium carbide (CaC_2) changing to calcium oxide, which is a heat liberating reaction. One of the intermediate reactions may be the formation of acetylene (C_2H_2) gas by the reaction of the moisture in the air and the calcium carbide. In any case the benefits obtained from using a small quantity of calcium carbide are definite in regard to the carbon pickup and desulphurization properties of the basic operation. However, if all factors in the operation are carefully studied and controlled there is reason to believe that similar results can be obtained more economically without the use of calcium carbide.

Acknowledgment: The author is indebted to members of his company for their contributions in preparing this paper. Others who deserve special mention for their contributions are Dr. W. J. McCaughey, Dept. of Mineralogy, Ohio State University, and W. W. Levi, Lynchburg Foundry Co.

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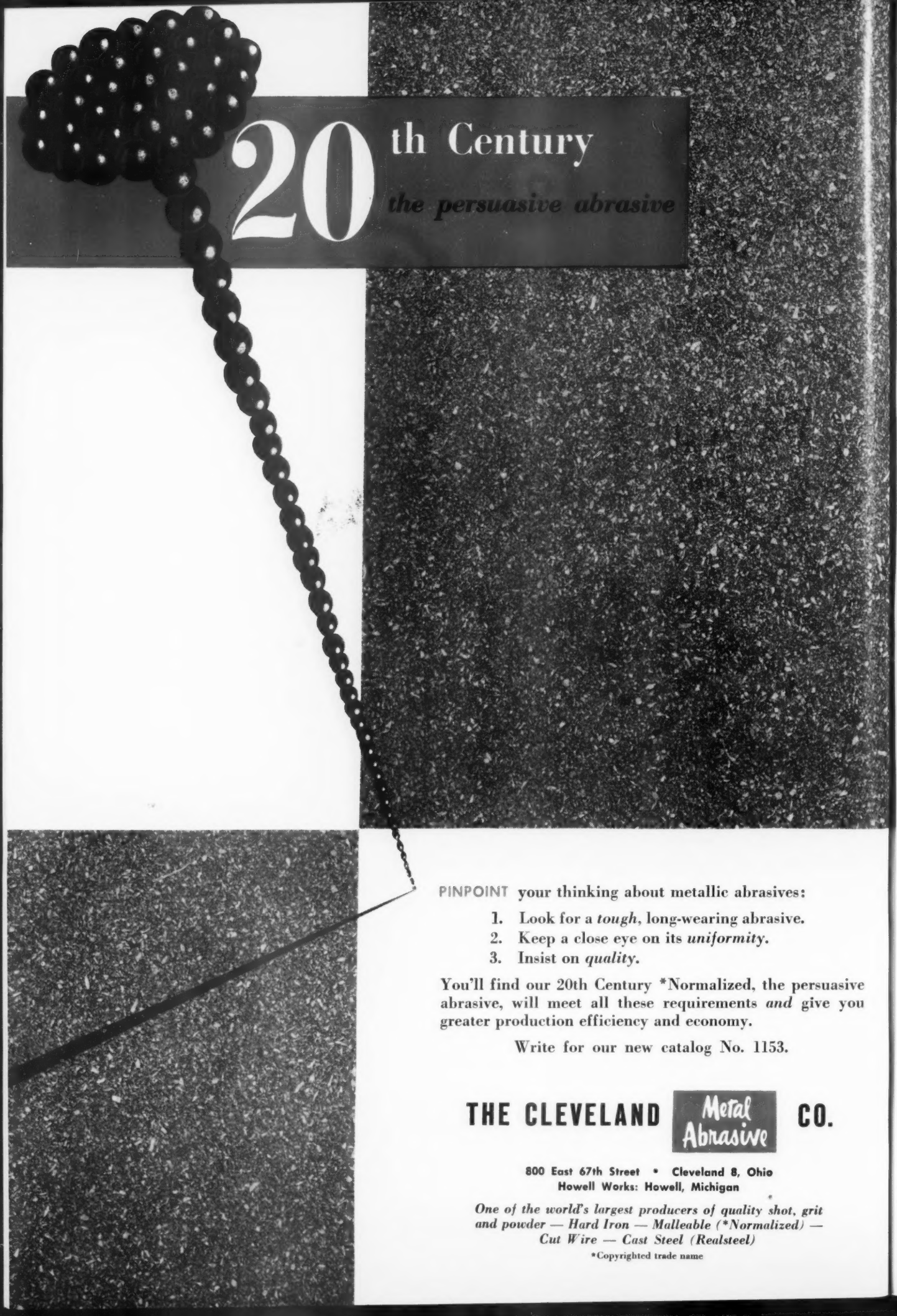

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FOUNDRY STATISTICS

MALLEABLE IRON

(Shipments of castings—net tons[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1952	926,120	573,472	.....
1953			
Oct.	73.727	45,589	104,046
10 mo.	834.444	501.567	.....
Nov.	63 663	37.561	93.156
Dec.	72,399	39.721	95,612
Total	970,506	578,749	.....
1954			
Jan.	70.288	38,266	85.565
Feb.	69,078	37.792	81.579
Mar.	84,342	47,125	74.219
Apr.	74.515	39.102	69.094
May	67.856	37.306	67,040
June	72.820	41.121	60.163
July	50,893	25,243	63.711
Aug.	59.259	34.528	62.494
Sept.	58.015	33.929	66.742
Oct.	64.321	36.956	71,090
10 mo.	661,387	371,368	.....

ALUMINUM

(Shipments of castings—1000 pounds)

	Shipments—Total	Shipments—Sand	Shipments—Perm. Mold	Shipments—Die	Unfilled Orders[2]
1952	518,979	194,616	146,883	169,732	.....
1953					
Oct.	55.097	17,171	17.030	20.547	115.189
10 mo.	555,437	183.119	167,722	201,355	.....
Nov.	51,014	16.169	15.396	19.012	106.977
Dec.	51.571	15.265	16,907	18,963	105,980
Total	658,022	214,553	200,025	239,330	.....
1954					
Jan.	51,446	14,698	16.615	19,709	103.318
Feb.	51.213	14.696	17.281	18.754	96.011
Mar.	56.184	14,468	19,576	21,645	93.407
Apr.	53,006	14,073	18.091	20.366	91,853
May	47,663	12,461	16,312	18,368	83,848
June	48,061	12,442	17,105	17,886	79,126
July	39.636	11,299	13,749	14.004	76.513
Aug.	42.429	11.252	15.335	15.213	76.684
Sept.	46.249	10.717	16.641	18.228	79.873
Oct.	53.421	12,375	19,148	21.245	88,296
10 mo.	489,308	128,481	169,853	185,418	.....

COPPER-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—Sand	Shipments—Perm. Mold	Unfilled Orders[2]
1952	1,009,910	910,862	63,865	.....
1953				
Oct.	83,899	74,460	5,775	51,723
10 mo.	848,039	753,178	51,157	.....
Nov.	74,782	66,370	5,077	48.842
Dec.	77,675	68,821	5,082	48,421
Total	990,496	888,369	61,316	.....
1954				
Jan.	71,437	63,034	4,618	42,351
Feb.	68,849	60,913	4,743	21,943
Mar.	76,480	67,952	5,123	38,417
Apr.	72,900	65,418	4,732	34,111
May	67,859	61,469	3,755	31,568
June	70,777	64,328	3,567	30,743
July	56,380	51,070	3,073	30,872
Aug.	68,891	63,389	3,547	28,883
Sept.	68,267	62,152	3,637	31,087
Oct.	70,036	63,614	3,620	30,251
10 mo.	691,876	623,339	40,460	.....

MAGNESIUM

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1952	34,857	32,977	.....
1953			
Oct.	3,024	2.717	11,473
10 mo.	29,145	26,618	.....
Nov.	2,681	2,417	10,612
Dec.	2,691	2,434	9,313
Total	34,517	31,469	.....
1954			
Jan.	2,451	2,149	8,800
Feb.	2,194	1,945	8,315
Mar.	2,407	2,109	7,698
Apr.	2,068	1,857	7,358
May	1,738	1,541	7,522
June	2,034	1,820	8,296
July	1,924	1,712	8,073
Aug.	2,157	1,944	7,795
Sept.	2,059	1,855	7,474
Oct.	2,053	1,837	7,269
10 mo.	21,085	18,769	.....

PRODUCTION WORKERS

Estimated Number

(Thousands)

	Sept. 1954	Aug. 1954	Sept. 1953
Ferrous	184,500	186,800	215,500
Nonferrous	56,900	54,500	74,900

Average Weekly Earnings

Gray Iron	73.88	73.49	73.84
Malleable Iron	74.11	75.07	73.14
Steel	75.42	75.62	78.80
Nonferrous	80.99	79.80	80.60

Average Weekly Hours

Gray Iron	39.3	39.3	39.7
Malleable Iron	38.2	39.1	38.7
Steel	37.9	38.0	39.4
Nonferrous	39.7	39.7	40.5

Labor Turnover Rate (September)

(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	2.5	2.8	1.2	1.3
Malleable Iron	2.9	2.9	1.3	1.2
Steel	1.8	3.1	0.9	1.7
Nonferrous	5.4	4.1	0.9	2.6

Source: Bureau of Labor Statistics

GRAY IRON CASTINGS—SHIPMENTS

(Net tons[1])

	All Castings—Total	All Castings—For Sale	Miscellaneous Castings—Total	Miscellaneous Castings—For Sale	Heavy Steel Ingot Molds—Total	Heavy Steel Ingot Molds—For Sale	Chilled Railroad Car Wheels—Total	Pressure Pipe & Fittings—Total[3]	Soil Pipe & Fittings—Total[3]	Unfilled Orders[2]
1952	12,869,464	7,371,700	8,122,274	3,792,567	2,238,309	1,070,252	544,896	1,312.518	651,467	.....
1953										
Oct.	1,146,728	656,612	672.571	304.245	247,324	125,534	41,858	119,124	65,851	1,075,538
10 mo.	11,662.062	6,366.078	7,220.945	3,128.025	2,370,426	1,167,362	405,799	1,088,616	577.276	.....
Nov.	1,008,908	569,561	592,145	269,577	229.013	112.234	31,332	102.275	54,143	977,012
Dec.	1,036,932	558,204	636.747	277,852	229,720	109,887	30.011	94,707	45,747	954,885
Total	13,707,902	7,494,843	8,449,837	3,675,454	2.829.159	1,389,483	467,142	1,285,598	677,166	.....
1954										
Jan.	932.298	488.497	607.755	261,164	154,359	60.947	31,316	90,898	47,970	871,918
Feb.	936.364	491.983	607,085	252.591	156.933	70.261	29,240	92,546	50,560	865,344
Mar.	1,046.779	553.358	684,272	282.328	153,366	65,950	34,240	113,016	61,895	842.499
Apr.	995.052	528,027	657.126	263,147	126.083	56,114	29,075	116.420	66,348	826,491
May	943.335	516.475	605.385	247,623	122,839	57,106	27,144	122.514	65.453	775.278
June	986,810	556,047	616 317	261,133	141,712	70.060	30,883	130.503	67.395	803,570
July	821.151	449.621	510.173	209.294	131,180	62.681	22.902	98,810	59,086	828,924
Aug.	934.644	541,904	569,790	250.702	140,165	69,897	29,134	127.255	68,300	829,505
Sept.	921.232	533.909	559,934	248,124	139.679	68,053	25,374	124,821	71,424	810,654
Oct.	942.934	552,022	569,985	253,802	150,282	79,191	29,979	130,326	68,362	789,117
10 mo.	9,460,599	5.211,843	5,987,822	2,529,908	1,416,598	660,260	289,287	1,147,109	626,793	.....

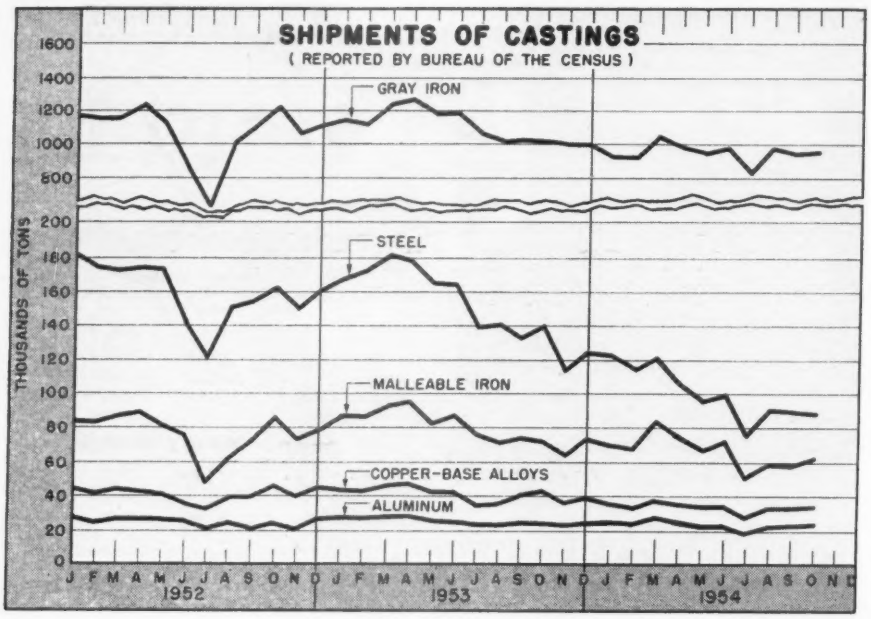
STEEL CASTINGS—SHIPMENTS

(Net tons[1])

	All Castings—Total	All Castings—For Sale	All Castings—Railway Specialties	Carbon Steel—Total	Carbon Steel—For Sale	Carbon Steel—Railway Specialties	Alloy Steel—Total	Alloy Steel—For Sale[4]	Alloy Steel—Railway Specialties	Unfilled Orders[2]
1952	1,927,942	1,476,242	339,561	1,375,233	1,076,285	298,948	552,709	389,816	40,613	.....
1953										
Oct.	140,766	106,813	25,318	99,700	75.260	23,440	41,066	30,780	1,878	313,684
10 mo.	1,596.673	1,222.667	284,577	1,111,808	851,535	260,273	484,865	360,128	24,304	.....
Nov.	114.229	85,047	17,768	79,314	63,086	16.228	34,915	27,108	1,540	308,526
Dec.	123.295	92,299	18,665	85,607	68,617	16,990	37,688	29,912	1,675	278,389
Total	1,834,197	1,400,013	321,010	1,276,729	983,238	293,491	557,468	417,148	27,519	.....
1954										
Jan.	122,758	93.577	20,197	83,927	62.749	18,407	38,831	30,828	1,790	251,847
Feb.	116.520	88,699	17,938	81,433	60 638	15,961	35,087	28,061	1,967	234,634
Mar.	122,310	92,271	15,684	85,211	62,955	14,190	37,099	29,316	1,494	214,367
Apr.	105,788	78,754	11,031	72,118	52.389	9,538	33.670	26.365	1,493	197,857
May	94,610	70,596	9,454	64,546	46,651	8,342	30,064	23.945	1,112	182,502
June	100,022	72,881	8,639	69,021	48,327	7,552	31,001	24,554	1,087	169,594
July	75,848	53.207	5,815	50,453	33,461	4,964	25,125	19,746	851	170,567
Aug.	89,590	66 792	9.844	61,344	44,236	8,148	28,256	21,360	1,196	168,303
Sept.	88,359	64,722	8,668	59,039	41,735	7,690	29,320	22,009	978	158,823
Oct.	87,085	64,004	8,580	56,705	39,872	7,596	30,380	23,148	984	154,079
10 mo.	1,002,890	745,503	115,350	683,797	493,013	102,388	318,833	249,332	12,952	.....

[1]Source: Bureau of Census. [2]For sale only. [3]All cast iron pipe is shipped for sale. [4]Railway specialties not included.

FOUNDRY STATISTICS



COMMERCIAL HEAT TREATING

(National Billings of Metal Treating Institute Members)

	1952		1953		1954	
	No. Reporting	Total Reported	No. Reporting	Total Reported	No. Reporting	Total Reported
July	56	$2,253,346	58	$2,522,651	61	$1,722,449
Aug.	57	2,287,135	60	2,452,186	62	1,801,659
Sept.	57	2,498,544	57	2,522,127	64	1,853,665
Oct.	57	2,837,574	59	2,782,219	62	1,916,504
Nov.	53	2,321,932	59	2,493,497	60	1,916,333
11 mo.		28,443,949		29,513,661		20,178,017
Annual total		30,875,924		31,733,067		.....

ZINC-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments		Unfilled Orders[2]
	Total	For Sale	
1952	408,353	282,673	.....
1953			
Oct.	40,882	28,441	73,237
10 mo.	444,924	295,577	.....
Nov.	37,668	26,097	69,367
Dec.	38,661	27,348	64,105
Total	521,253	349,022	.....
1954			
Feb.	37,660	24,112	55,351
Mar.	42,991	28,828	52,544
Apr.	38,968	25,211	51,388
May	36,793	23,671	46,726
June	40,708	26,890	47,537
July	28,306	18,605	43,231
Aug.	34,639	24,898	46,288
Sept.	36,594	25,617	56,006
Oct.	39,072	27,377	64,499
10 mo.	376,127	262,466	.....

INDEX OF FOUNDRY EQUIPMENT ORDERS

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1953	1954
Jan.	99.6	173.8
Feb.	97.5	99.9
Mar.	132.2	82.7
Apr.	111.8	125.3
May	182.7	80.8
June	156.8	86.4
July	159.2	68.8
Aug.	236.3	75.6
Sept.	127.7	68.3
Oct.	87.2	147.5
Nov.	150.0	....
Dec.	161.2	....

Note: Figures are percentages of the base period 1947-49 taken as 100 per cent (monthly average). This is a new base period. Source: Foundry Equipment Manufacturers Association.

COKE PRODUCTION & CONSUMPTION

(Net tons)

	Production	Consumption Total	Consumption By Foundries
1952	68,254,109	67,865,639	3,102,446
1953			
Oct.	6,554,638	6,555,613	236,329
10 mo.	66,166,642	66,146,218	2,488,205
Nov.	6,208,155	6,039,813	216,837
Dec.	6,093,009	6,041,383	210,388
Total	78,467,806	78,227,414	2,915,420
1954			
Jan.	5,812,426	5,639,117	224,298
Feb.	4,889,717	4,920,651	211,114
Mar.	5,146,189	5,177,765	228,139
Apr.	4,693,036	4,569,843	212,272
May	4,802,245	4,656,950	204,958
June	4,640,064	4,683,726	194,664
July	4,618,665	4,555,701	170,617
Aug.	4,510,603	4,501,477	195,344
Sept.	4,490,603	4,434,650	191,607
Oct.	5,083,271	5,099,678	207,908
10 mo.	48,686,819	47,239,558	2,040,921

INGOT BRASS & BRONZE

(Shipments in net tons)

	1953	1954
Jan.	24,423	20,661
Feb.	25,429	19,920
Mar.	28,256	23,653
Apr.	25,044	24,746
May	21,660	22,269
June	20,818	22,348
July	19,321	17,074
Aug.	20,156	21,684
Sept.	21,463	22,464
Oct.	22,280	24,080
Nov.	21,860	23,061
Dec.	20,541	.....
Total for year	271,251	.....

IRON AND STEEL SCRAP CONSUMPTION

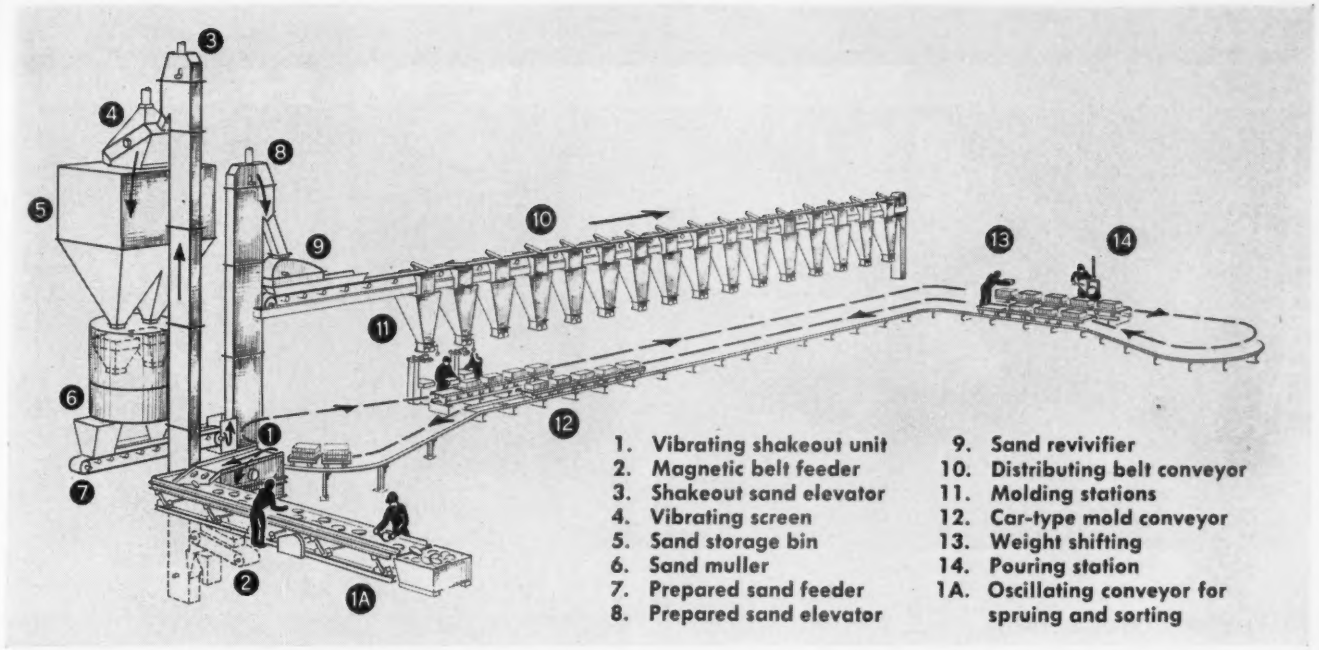
(Gross tons*)

	All Scrap Total	By Types of Furnace—Cupola Total	Air Total	Electric Total
1952	61,625,549	9,154,146	1,053,233	8,015,064
1953				
Sept.	5,395,721	782,131	80,866	595,523
9 mo.	53,642,566	7,454,245	722,514	6,726,518
Oct.	5,628,568	779,444	75,618	566,878
Nov.	5,064,565	687,498	60,200	477,666
Dec.	4,690,277	755,276	68,002	442,818
Total	69,005,976	9,676,463	1,026,334	8,263,880
1954				
Jan.	4,574,384	711,335	71,202	505,536
Feb.	4,385,340	704,535	67,263	462,095
Mar.	4,637,573	783,529	82,337	517,702
Apr.	4,582,862	748,766	79,183	518,048
May	4,776,603	710,159	67,368	506,582
June	4,664,561	725,910	75,306	515,019
July	3,909,336	565,275	45,920	420,564
Aug.	4,164,703	671,631	65,336	486,596
Sept.	4,298,495	675,593	68,860	500,349
9 mo.	39,993,857	6,296,733	622,775	4,432,491

PIG IRON PRODUCTION AND CONSUMPTION

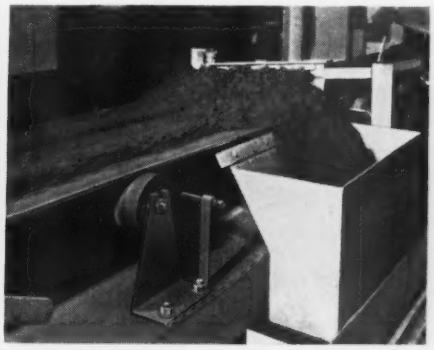
	Production** (standard grades—net tons)					Consumption* (By type of furnace—gross tons)			
	Total	Foundry	Malleable	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Total	Cupola	Air	Electric
1952	61,306,723	2,864,722	3,013,267	48,253,390	7,175,344	61,550,961	5,438,294	449,646	118,820
1953									
Nov.	5,995,511	201,047	277,181	4,859,252	658,031	5,324,537	343,233	17,528	15,842
11 mo.	69,166,574	2,427,024	3,459,999	55,839,492	7,709,127	61,545,578	4,543,642	253,715	151,706
Dec.	5,712,937	172,283	276,432	4,625,524	638,698	5,091,786	374,838	18,596	12,561
Total	74,878,511	2,599,307	3,736,431	60,465,016	8,347,817	66,637,364	4,918,480	272,311	164,267
1954									
Jan.	5,531,137	184,629	294,691	4,510,870	540,947	4,933,282	362,576	17,620	14,578
Feb.	4,764,613	156,178	272,707	3,911,670	424,058	4,293,942	351,824	17,257	9,892
Mar.	4,907,147	213,249	243,356	3,977,137	473,405	4,367,814	390,929	21,369	13,112
Apr.	4,449,289	155,249	256,662	3,630,901	406,477	4,021,957	375,045	26,553	10,497
May	4,572,252	154,768	231,479	3,741,671	444,334	4,188,269	367,437	16,453	16,531
June	4,683,629	175,759	200,154	3,853,444	454,272	4,297,531	375,601	18,545	14,196
July	4,590,076	182,130	182,527	3,790,999	434,420	3,990,431	293,926	12,258	13,317
Aug.	4,529,291	186,097	165,891	3,722,094	455,209	4,013,552	354,067	15,926	10,325
Sept.	4,417,888	188,599	179,629	3,622,799	426,861	.....	.....	.....	.....
Oct.	4,937,436	212,237	248,643	3,979,437	497,119	.....	.....	.....	.....
Nov.	5,204,446	202,824	263,484	4,233,253	504,885	.....	.....	.....	.....
11 mo.	52,587,204	2,011,719	2,539,223	42,974,275	5,060,657	.....	.....	.....	.....

*Source: U. S. Dept. of Interior. Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For sale only.



In this modern foundry layout, movement of sand and castings is completely mechanized. With Link-Belt conveying and preparation equipment, gray iron, steel, malleable and non-ferrous foundries can have lower costs, increased output.

Link-Belt automatic shakeout steps up production, removes workmen from hazardous areas, frees them for other jobs.



Conditioned sand is quickly, conveniently distributed to molders' hoppers by flat roll belt conveyor with adjustable plows.

Ideal for handling hot sand and castings, Oscillating conveyors speed cooling, spruing and sorting of castings while en route.

Link-Belt mechanization not only makes large and small foundries a better place to work - - it

raises production-lowers unit costs

TODAY, large and small foundries alike find modernization the only answer to intensified competition. To bring down their costs and make the most efficient use of manpower, they have conveyorized sand and casting handling to a degree undreamed of even a few years ago.

Many of these progressive foundries are completely equipped with Link-Belt conveying and preparation equipment. And just as others have been able to produce better castings at lower cost, Link-Belt mechanization can step up your profits, too. That applies whether your foundry is gray iron, steel, malleable or non-ferrous. Whatever you require in equipment or engineering services, Link-Belt can cut your operating costs . . . and at the same time make your foundry a better place in which to work.

Whenever you have a castings or sand handling or preparation problem, you'll find it pays to call your nearby Link-Belt office. Ask for Book 2423. It shows Link-Belt's complete line of modern equipment for ferrous and non-ferrous foundries plus 7 tested layouts.

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MEMBER FEMA

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NEWS VIEWS

TRAVELING SCHOLARSHIP: Royal Technical College, Glasgow, Scotland, recently established an annual traveling scholarship honoring John Bell's 31 years as secretary of the Scottish Branch, Institute of British Foundrymen. Mr. Bell currently is president of the institute. Above, left to right, at the presentation ceremony, are Dr. D. S. Anderson, Sir Andrew McCance and Dr. R. Hay, director, chairman of governors and professor of metallurgy, respectively, Royal Technical College, Mr. Bell, G. M. Menzies, managing director, North British Steel Foundry Ltd., and Henry Gardner, joint-managing director, Glenfield & Kennedy Ltd. Scholarship fund is about $5000

INSPECTION TOUR: Assistant Secretary of the Army, Frank H. Higgins, center, recently inspected the foundry of Harvey Machine Co., Torrance, Calif., while on a tour of Southern California's guided missile industry. Leo M. Harvey, chairman of the board, left, Lt. Col. J. E. Johnston, district chief, Los Angeles Ordnance District, rear, and Lt. Col. William R. Campbell, aide to Secretary Higgins, were in the inspection party with the Secretary

SHOP TALK: For its November meeting, the Detroit Chapter of the American Foundrymen's Society were guests of General Motors for a tour of the plant and foundry of Pontiac Motor Division. Dinner was served in the plant cafeteria and a short talk by R. W. Critchfield, general manager of the division, preceded the tour. Shown above discussing some of the cores used at Pontiac are, left to right, Jess Toth, Harry Dietert Co., George Collingwood, foundry manager, Pontiac Motor Division, and Clifford Hockman, foundry manager, Cadillac Motor Car Division

MORE SUPPORT: Robert Dodge, Archer-Daniels-Midland Co., left, recently presented J. F. Smith, center, committee chairman, Foundry Educational Foundation Advisory Committee of Michigan State College, with a check for $2000 as a company gift to the educational program. H. C. Esgar, assistant secretary, FEF, right, looks on

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AROUND THE COUNTRY

NEWS REPORTS FROM

- Detroit
- Chicago
- Philadelphia
- Los Angeles
- New York

Detroit— Construction work on Ford Motor Co.'s new manufacturing development facilities building for research on manufacturing methods and processes at 12723 Telegraph Rd. is well under way.

Started last summer, the building will contain laboratories and testing rooms, permitting consolidation of five manufacturing engineering development departments now housed in various buildings at the Rouge plant. A foundry is included and experimental work now being conducted elsewhere on the C and D molding processes will be transferred to the research foundry.

Some work on automotive gas turbine engines also will be done here. However, much of the work on this project will continue at the year-old Pilot Gas Turbine Laboratory.

General Motors Corp. also is showing continued interest in the C and D molding processes and gas turbine development. Work in these fields is under way in GM's new research center.

Outside of automotive shops, foundry business in this area is just beginning to pick up. Foundrymen and supply and equipment people show conservative optimism for first quarter activity. But nothing in the current picture gives them cause for optimism beyond that time.

Chicago— Foundry activity in this area at start of 1955 is close to the level which prevailed at beginning of 1954, but there is a difference. Last year it was trending down; now it is moving up. Optimism prevails today somewhat guardedly, because what lies ahead depends too much on automobile production this year.

Building construction looks solid for 1955, and major farm implement companies are boosting their schedules moderately, but neither can be expected to hold the foundry industry up if autos don't sell well.

Because raw materials are in adequate supply and producers can ship promptly, foundries find no necessity to order far ahead. The practice is to carry inventories of pig iron and fuel at a minimum. As a result, there is a lot of spot buying to match melting schedules. This is a healthy situation. So long as spot buying is good, the requirements for castings is good.

* * *

John L. McCaffrey, president of International Harvester Co., is general chairman of the 1955 Junior Achievement Trade Fair to be held Feb. 5-6 in the Chicago Coliseum. At the fair some 150 Junior Achievement companies will display their wares to climax National Junior Achievement Week.

One of the companies to be represented in the Fair is the Busy Bee Foundry Co. Organized by students of Tilden Technical High School and

(*Continued on page* 200)

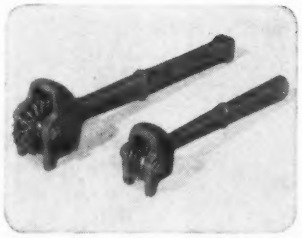
NEW

dresser wears longer
cutters change quicker

Longer life—by far—plus quicker, easier-than-ever cutter change are basic improvements in the patented, new type Desmond Huntington dressers. Supplied at no extra cost in No. 1, 2, 21, and 22 sizes. Note the new construction: hardened side washers, press fitted into head, positively secured with slotted hex head bolts and lock washers. Remove one bolt (with wrench or screw driver) to free spindle for quick cutter change.

Ask your Desmond industrial distributor for Bulletin D-48. He can help make your grinding wheels perform better—longer—with proper dressing.

Desmond-Stephan Mfg. Co., Urbana, O.



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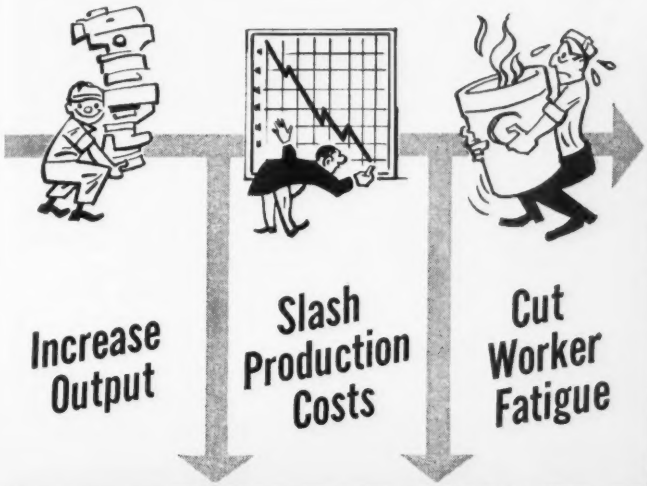
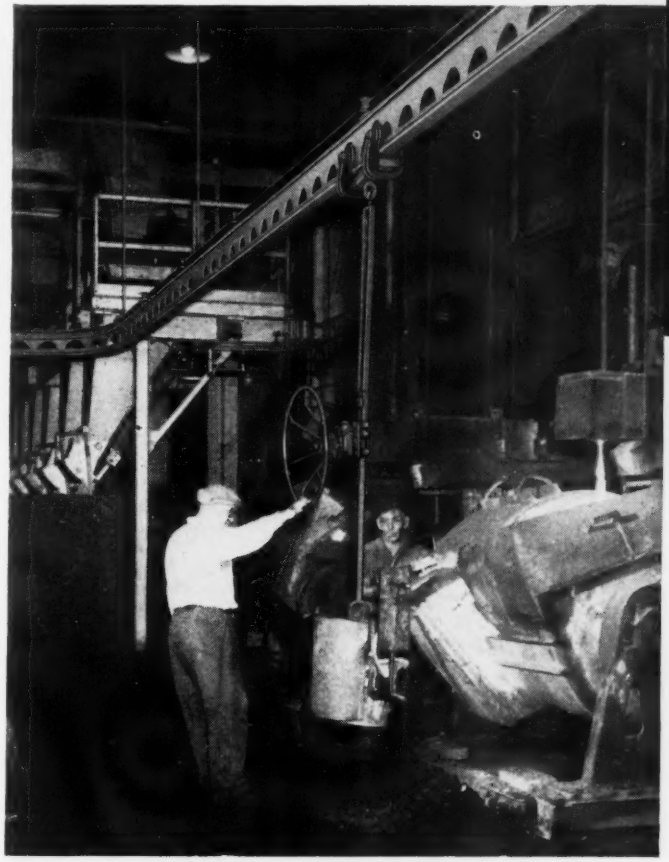
Convey Hot Metal *the Efficient* Tramrail Way



Increase Output

Slash Production Costs

Cut Worker Fatigue



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This is very evident in the handling of hot metal. Large ladle-fulls can be taken directly from cupola to molds without in-between transferring. This means fewer trips and faster pouring. Heat loss is greatly reduced. The work is safer and easier because it is simply a matter of guiding the smooth-rolling overhead carriers.

The same overhead trackage can be used for most other handling: Patterns, cores, sand, flasks, castings, etc. and save time and worker fatigue on every lift and move.

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3X Blazecrete . . . the 3000F refractory . . . is easily and quickly applied . . . mix with water like ordinary concrete, and slap-trowel to desired thickness. Hardens without application of heat. Contains no harmful irritants . . . safe even for hand application. 3X Blazecrete is furnished as a dry mix, and may be stored indefinitely without deterioration.

You'll also find 3X Blazecrete ideally suited for forming run-out spouts and for gunning parts of iron cupolas.

Send for free brochure on Blazecrete (RC-28A) describing its properties and uses. To obtain your copy—as well as additional application details—write Johns-Manville, Box 60, New York 16, N. Y. In Canada, 565 Lakeshore Road, Port Credit East, Ontario.

Whether you gun it... *or slap-trowel it...*

JOHNS-MANVILLE JM PRODUCTS **Johns-Manville BLAZECRETE**

BUILDS BETTER REFRACTORY LININGS

(*Continued from page* 198)

sponsored by Crane Co., the J. A. company makes its castings in the Crane research foundry where an electric induction furnace is available for melting gray iron and bronze and a gas-fired unit for melting aluminum.

For direct merchandising, Busy Bee makes bronze, gray iron and aluminum trivets, and bud vase rough castings of bronze. For Tilden Tech it makes gray iron grinder stands and gray iron and bronze lamp bases and stems. For another Junior Achievement company, named Jameco and sponsored by James S. Kemper Co., Busy Bee makes gray iron paper weight castings in replica of the old fire insurance "fire marks."

Sponsoring a Junior Achievement company which engages in producing castings is an old story for Crane Co. Preceding Busy Bee was the Blue Devils Foundry Co., which was organized in October, 1952, and was liquidated in May, 1954, according to J. A. regulations. For the two years it was in business it won the top national awards as being the outstanding company in all fields—sales, finance and production. In the first year it was the top among 34 awards and in second year top among 40 awards. In addition, the J.A. vice president won a $500 college scholarship maintained by the Purchasing Agents Association of Chicago.

Prior to the Blue Devils, Crane Co. had sponsored the JA Aluminum Co., which made aluminum castings in the model foundry at the Museum of Science and Industry.

Philadelphia— No perceptible surge of new casting orders marked the turn of the year. Actually, gray iron foundry operations are lower than they were late last fall, averaging 70 to 75 per cent, as against 75 to 80 per cent. Most of these foundries are working four to five days a week, with backlogs around two weeks.

Situation in malleable is more active than in gray iron, with construction needs, such as fittings and electric conduits, bolstering production. Most malleable shops are operating at around 80 to 90 per cent of normal capacity. But railroad business still is lacking and there is not much coming out from the automotive industry, which at best is none too active in this area. Backlogs of malleable producers continue to average around six to eight weeks.

Steel foundry operations lag behind those of the other ferrous shops. Few shops are operating at more

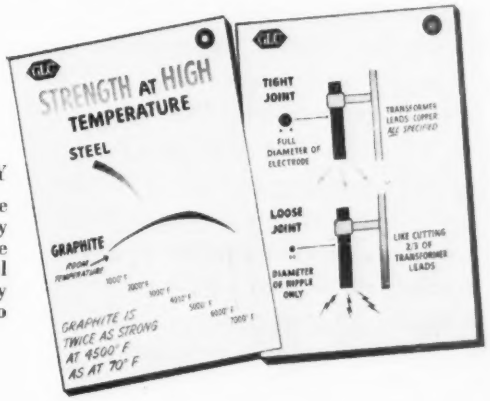
(*Continued on page* 203)

MAKE YOUR ELECTRODES STOP LOAFING!

Let your men see and hear *The Electrode Story* — a shop-level informational program aimed at developing optimum electrode service for electric steel producers.

This series of four illustrated talks — developed especially for melt shop personnel — gives the men-on-the-furnace a better knowledge and understanding of electrode handling and joint assembly.

***The Electrode Story* was developed to help effect important economies in electrode utilization, and thus contribute to the advancement of the electric steel industry as a whole. It is being made available to electric furnace steel producers without charge or obligation. This forward-looking program can help your company get optimum service from electrodes and substantially reduce electrode costs.**



Typical Panels From THE ELECTRODE STORY

Two of the many informative panels that dramatize simply yet forcefully the importance of electrodes in electric steel making, and the reasons why proper shop practice is so important.

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St. Louis Steel Casting Company
Sterling Steel Casting Co.
. . . and many others

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". . has shown marked improvements in the Melting Department."
". . one of the best things that ever happened to educate the men on the furnace."
". . the results of the lectures are noticeable daily in the extra care taken in handling and assembling electrodes."
". . a model of the use of visual aids and of conference and discussion techniques."
". . the men are more careful now."
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"Great Lakes takes the long-range view that it is better to sell an extra carload of electrodes because a customer has added another furnace, than because he is getting less-than-optimum service out of his existing equipment"— from an article in STEEL.

"wedded" to your present abrasive?

If, for one reason or another, you're committed to a particular brand of abrasive—just turn the page and never mind about CUT STEEL! However, if you're not "wedded", then here's news for you. There's a revolutionary, new type of abrasive that sets a *much higher* standard for the cleaning of castings and forgings. Actually *cut* from high quality alloy steel, it's appropriately named CUT STEEL—and it does an incredibly fine job of cleaning.

In cleaning speed, finished appearance, length of service and low maintenance costs—CUT STEEL will definitely outperform all other abrasives. Yet, Grade "A" CUT STEEL ***sells for less than most cast steel shot*** and Grade "B" ***costs no more than most malleable shot!***

Therefore, if you're "free" to investigate better ways to clean your castings and forgings—be sure to try new CUT STEEL! Samples, prices or trial order, gladly, on request. Write today!

Sooner or later, you too, will change to CUT STEEL!

CUT STEEL
ABRASIVE

ANNEALSHOT and SUPER-ANNEALSHOT

PRODUCTS OF

METAL BLAST, INC.

872 EAST 67th STREET • CLEVELAND 3, OHIO

In its original form, CUT STEEL resembles steel grit, with sharp edges and corners.

In usage, it rapidly changes to a spherical shape, in a wide variety of sizes.

(*Continued from page* 200)

than four days a week and trade estimates place output, percentagewise, at around 60 of normal. Steel casting producers sorely miss government work which some months ago sent operations to capacity levels, with backlogs running into months instead of weeks.

Brass and bronze business is slow, with most jobbing shops doing little better than 60 per cent, if as well. This reflects virtually no change from a month and a half to two months ago. Government work, especially aircraft requirements, is helping to maintain a fairly high operation for the aluminum shops in the area.

Among gray iron foundries, pipe shops still are the most active, despite the season of the year. They are said to be operating at normal capacity. There is a slight pickup in textile machinery requirements, but, as these have been low for some time, this doesn't mean too much in the overall picture.

Los Angeles—1955 began on a disquieting note for local foundrymen, who are again the subjects of political attacks over the smog problem in Los Angeles. With public indignation over smog climbing to fever pitch, the Los Angeles County Board of Supervisors approved action of the Air Pollution District in arraigning three local foundries in municipal court on excessive smoke charges.

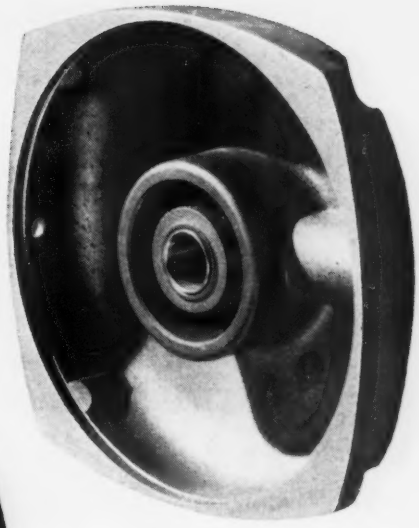
"We're not going to take these unfounded political attacks without a fight," one influential foundryman said. "We've spent millions of dollars on anti-smog equipment in the past several years, and we'll take our case to the highest courts if necessary." Other foundry operators were equally indignant. "We're always the scapegoat," a steel foundryman said. "We're getting tired of bowing to political opportunists."

Aside from the smog problem, foundrymen entered 1955 in a pleasant state of mind. Most steel foundries report 1954 was a good year, and nonferrous foundries say their 1954 sales volume was at least as good as 1953. Only a few scattered foundries made poor showings, and most of these say their slack season was the first half. Second half figures found business up 10 per cent.

Aircraft industry requirements for cast gray iron forming dies are higher, and demand is increasing from makers of motors and oil country tools. Machine shops are active.

Foundries furnishing castings for floor furnaces and hardware manufacturers are still feeling the effect

What customer wouldn't love to CUT COST 40%?

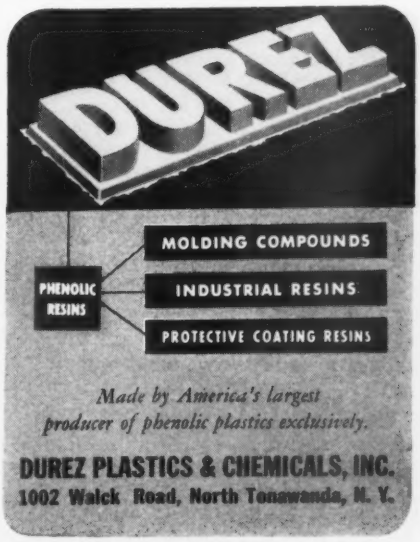


Here's an example SHELL MOLDED with DUREZ resin

Less metal. Shell Cast Alloys, Limited, of Canada cast this grey iron oil burner motor housing part in shell molds, achieving a 30% weight reduction as compared with green sand casting. Dual savings resulted: in metal and in freight costs.

Less finishing. In green sand, polishing and finishing cost the customer 11¢ per piece in material and labor prior to applying enamel coating. Surfaces of the shell castings are so smooth that no polishing is required and all machining is eliminated. Precision of shell casting is such that center hole tolerance is held within +.004 and −.000.

What you can expect. Overall cost reduction of 40% on this job is above average. But when you consider possible savings in metal, handling, space, sand, and time, you may find excellent reason for shell molding. Durez, pioneers in the field, can serve you in many ways. We have foundry resins of proven excellence, adhering agents, and experience that is entirely at your service.



FREE BULLETINS on shell molding developments

DUREZ PLASTICS & CHEMICALS, INC.
1002 Walck Road, North Tonawanda, N. Y.

Put me on your mailing list for "Shell Molding News"

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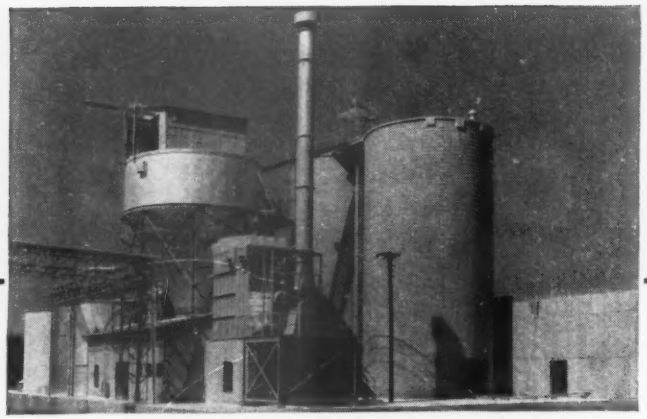
SHELL MOLD RESINS THAT FIT THE JOB



2 New Neff & Fry Storage Bins

These 30′ x 67′6″ Neff & Fry Bins were recently erected at the Sandersville, Ga., plant of The Thiele Kaolin Company for handling and storing spray-dried coating clays.

This is an example of the thousands of bins we have built to handle more than 80 kinds of flowable bulk materials—principally ashes, cement, clay, coal, grain, gravel, lime, limestone, ore, sand, and wood chips.

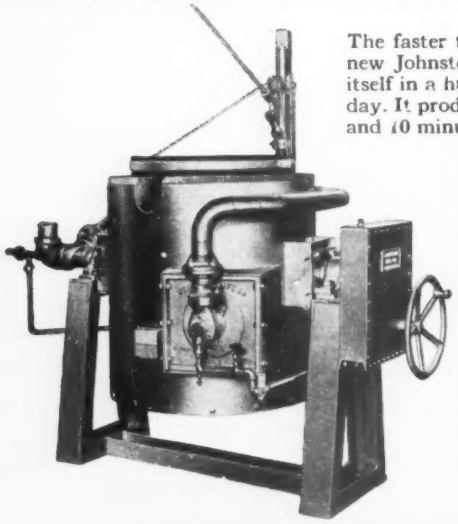
Our bins have many advantages which are explained in our interesting folder entitled, "Bins With the Strength of Pillars." A copy is yours for the asking. No representative will call except by invitation.

Request the folder now while it's on your mind.

THE NEFF & FRY CO.
214 ELM ST. • CAMDEN, OHIO

NEFF & FRY ▶ SUPER-CONCRETE STAVE STORAGE BINS

NEW FURNACE— Melts 1200 Lbs. of Brass IN 1 Hour, 10 Minutes!



The faster the furnace—the lower your cost. The new Johnston No. 400 Crucible Furnace pays for itself in a hurry by hustling more heats into every day. It produces 1200 lbs. of molten brass in 1 hour and 10 minutes on successive heats, gas fired (may also be oil fired as is model shown). Johnston burners, blowers and experienced engineering combine to produce unusual speed with economically low fuel consumption.

A new enclosed tilting mechanism makes tilting easier than ever before and it may be electrically driven.

Crucible life and lining life are extremely good. Trunions are adjustable for best balance and are supported on large pillow block bearings. A simple, convenient cover lifting mechanism is operated from the front of the furnace.

WRITE FOR CATALOG 223F

OVER THIRTY YEARS EXPERIENCE IN THE DESIGN AND MANUFACTURE OF INDUSTRIAL HEATING EQUIPMENT

THE JOHNSTON LINE — SAFETY DEPENDABILITY — JOHNSTON MANUFACTURING CO. 2825 EAST HENNEPIN AVE. MINNEAPOLIS 13, MINN.
ENGINEERS & MANUFACTURERS OF INDUSTRIAL HEATING EQUIPMENT

of 1954's early building slump, bu anticipated increases in military an municipal construction are expecte to improve the building situation be fore much longer.

New York—Contrary to more op timistic predictions of a month o so ago, the new year has started of slowly for foundries in this district Gray iron shops, which represent th great majority of the ferrous found ries here, are operating on an aver age of less than four days a week and the steel and malleable shops while operating around five days, are doing so with restricted labor forces Backlogs are light in practically all cases, with competition keen.

Construction requirements are fairly active, notwithstanding the season of the year. For instance, a northern New Jersey producer of manhole covers is operating at an active clip —and among the nonferrous shops construction needs, such as for meters and valves, are helping to buoy an otherwise spotty situation, at least insofar as the brass and bronze foundries are concerned. Also, activity among these latter shops is stimulated by a mild improvement in inquiry from the shipyards, especially for propeller wheels.

White metal shop business is being bolstered by continued good demand from aircraft and radar manufacturers. Shops participating in this business are operating at a full five days a week; those who are not, are finding the going rough in sustaining anything like normal operations.

Foundries are having little difficulty getting whatever they need in the way of raw materials. Scrap, pig iron and coke are plentiful.

Book Review

Nickel in Iron and Steel, by A. M. Hall, 595 pages, 6 x 9 in., cloth, published by John Wiley & Sons Inc., 440 Fourth Ave., New York 16, N. Y. Price $10.

Nearly 800 papers were reviewed for this book which correlates all of the important published data on nickel as an alloying element in steel and cast iron. All the papers reviewed are listed in a bibliography in the book. The introduction covers the occurrence and refining of nickel ores. Remainder of the book concerns itself with such topics as the physical properties of steels containing nickel, structure and heat treatment of wrought and cast nickel steels, effect of nickel on various engineering properties, corrosion and welding of nickel steels, effect of nickel on constitution of cast iron, its tensile strength and its hardness. Each chapter concludes with a summary.

NEW

ARO HEAVY DUTY 3" GRINDER

SMALLER...YET MORE POWERFUL

WEIGHT . . . . . 5-1/2 POUNDS

LENGTH . . . . . 16-3/4 INCHES

DIAMETER . . . . . 2-1/32 INCHES

SPEED . . . . . 17,000, 14,000 12,000, 9,000 RPM (GOVERNED)

SPINDLE. . . . . 5/8" x 11", 1/2" x 20", 3/8" x 24"

TRY IT . . . COMPARE IT . . . BUY IT . . .

Write for Bulletin Number 5459T

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Aro Equipment of California, Los Angeles, Calif.
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AIR TOOLS
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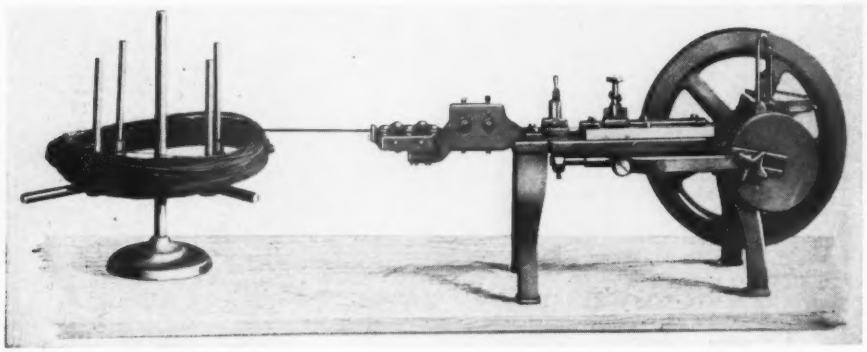
NEW EQUIPMENT AND SUPPLIES



Wire Machine: Lewis Machine Co., Dept. 5J, 3441 East 76th St., Cleveland 27, O.—Short lengths of core wire from one to 12 in. long and up to ⅛-in. in diameter can be straightened and cut to size on wire machine that can be hand operated for small quantity production or belt or motor driven for increased production. Graduated scale adjustment produces any desired length of wire. Wire on reel adjustable to any size coil is fed by reciprocating feed clutch, automatically straightened and cut to length. Wire is straightened by ten-roll straightener. Other models with stationary cut-off or flying shear, and with selection of feed speeds, are available to cut or straighten material up to ¾-in. in diameter.

For More Details Circle No. 1—Page 209

Cutting-Gouging Torch: Arcair Co., 423 South Mount Pleasant Ave., Lancaster, O.—Small cutting and gouging torch uses electrodes up to ¼-in. diam and operates from an ordinary direct current welding machine and a compressed air line. It can remove defects in castings or forgings, clean roots of welds, remove welds, groove, bevel or cut mild steel, stainless steel, hard alloys, brass, bronze, monel and cast iron. Unit is reportedly faster than chipping and cheaper to operate than oxygen equipment. Groove left by the torch is ready to receive the weld, without further preparation. Two other models using electrodes up to ⅜ and ½-in., respectively, also are available.

For More Details Circle No. 2—Page 209

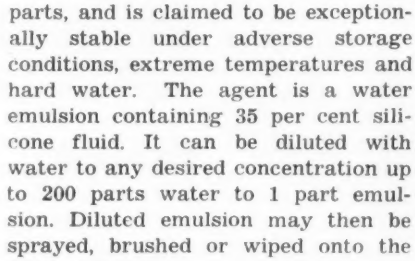
Drill Press: Sibley Machine & Foundry Corp., South Bend, Ind.—Drill press features a 22 x 30-in. table with a pedestal jack to support the table and permit its adjustment. Machine has a drilling capacity of 1 in. in cast iron and ¾-in. in steel. Full floating ball bearing spindle has a maximum travel of 8 in. and has a variable drive from which exact spindle speed may be obtained from any size drill from ⅛ to 1 in. Five options of spindle speeds each with a 4 to 1 ratio are available, ranging from a low of 206-825 rpm to a high of 540-2160 rpm with 3-phase, 60-cycle motor.

For More Details Circle No. 3—Page 209

Mold Release Agent: Dow Corning Corp., Midland, Mich.—Silicone mold release agent is for use with rubber, plastic and cast metal parts, and is claimed to be exceptionally stable under adverse storage conditions, extreme temperatures and hard water. The agent is a water emulsion containing 35 per cent silicone fluid. It can be diluted with water to any desired concentration up to 200 parts water to 1 part emulsion. Diluted emulsion may then be sprayed, brushed or wiped onto the mold surface.

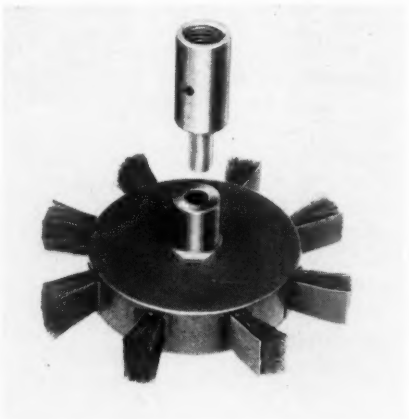
For More Details Circle No. 4—Page 209

Dust Collector: Aerodyne Development Corp., 1520 Lakeside Ave., Cleveland, O.—Mechanical dust collector incorporates a large number of small cyclones in parallel by having a secondary circuit which keeps discharge from the small cyclones under constant negative pressure to prevent recycling of dust in the primary system. System is adaptable to high and low temperature gases containing small and large abrasive or nonabrasive particles, and can serve a variety of collection or recovery purposes. System can be used alone or in combination with electronic precipitation at efficiencies up to 98.5 per cent, according to the manufacturer.



For More Details Circle No. 5—Page 209

Deburring Wheel Adapters: Merit Products Inc., 4023 Irving Place, Culver City, Calif.—Company has a complete line of adapters for use with its brush-backed deburring wheels. Adapters make it possible to use the abrasive wheels on any shaft up to 1¼-in. diam. Normally the sanding heads will fit any machine spindle but in cases where spindles are undersize, oversize or threaded, adapters are necessary. Adapters are available either for plain or threaded spindles in sizes from ¼-in. drill chucks to 1¼-in.-7 male thread. No other mount is needed.



For More Details Circle No. 6—Page 209

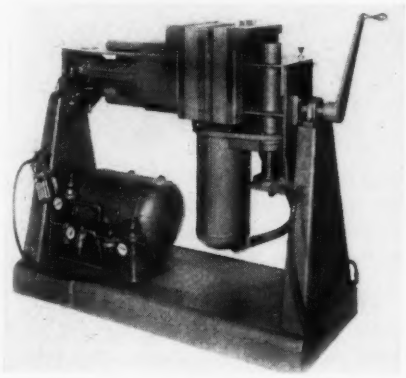
Belt Grinder: Ven Corp., 2832 Newell St., Los Angeles, Calif.—Belt grinder for heavy-duty production grinding of ferrous and nonferrous castings is powered by a 2-hp totally enclosed three-phase motor and control. The unit is constructed for wet grinding with a built-in coolant reservoir and coolant collecting troughs. All bearings are ball or roller type with protective seals to keep out grinding dust. Belts reportedly can be changed easily and quickly.

For More Details Circle No. 7—Page 209

Shell Core Blower: Shalco Engineering Corp., Palo Alto, Calif.—Shell core blower designed for use with conventional coreboxes is simi-

For More Details on These Items
Use Reply Card—Page 209

lar in operation to conventional core blowers, except that the corebox is heated and phenolic resin is used in place of conventional core binders. Gravity-type investment or standard coreblowing techniques can be used. Manufacturer claims that a



completely cured shell, ready for setting, can be produced every 30-50 seconds, depending upon wall thickness desired. Being hollow, cores are said to have excellent venting, collapsibility and burn-out properties. Model is designed to accommodate coreboxes up to 9 x 12 in. in width and up to 20 in. in length. By addition of longer heater plates, cores up to 30 in. in length can be produced. Heater plate temperature is thermostatically controlled. Required air pressure is 90 psi.

For More Details Circle No. 8—Page 209

Conveyor Pulleys: American Pulley Co., 4200 Wissahickon Ave., Philadelphia 29, Pa.—Line of heavy-duty steel conveyor pulleys features an interchangeable, split tapered hub which squeezes its shaft with a clamp grip when drawn into the pulley end disk. The line has been designed for use in any location, such as for drive, head, tail, snub, bend or take-up, when used with the proper number of plies of 42-oz duck belts. Pulleys are available as standard in either crown or straight face in sizes ranging from 6 in. through 60 in. diam, from 12 in. through 63 in. face, and for shaft sizes through 10 in. diam. Larger sizes can be built to order.

For More Details Circle No. 9—Page 209

Burners: Hauck Mfg. Co., 124-136 Tenth St., Brooklyn 15, N. Y.—Combination oil and gas burners for radiant tube firing in controlled atmosphere furnaces feature a control lever to adjust the length of flame to fit the tube. Manufacturer claims quieter operation as major portion of secondary or combustion flame air is introduced around the outside of flame retention nozzle. This diverted air flow prolongs combustion over a greater distance to get maximum distribution of heat. Equally good results are claimed with either gas or oil. Air supply pressure can be from 12 to 32 oz, oil from 45 to 60 psi, and gas from 2 to 6 in. wc, depending on the kind of gas and intended capacity. Pressures are then modulated by the control system for required operation.

For More Details Circle No. 10—Page 209

Tubeaxial Blower: Industrial Plastic Fabricators Inc., Norwood, Mass.—Unplasticized polyvinyl chloride tubeaxial blower is for expelling corrosive air, fumes and gases. All-plastic impeller blade of the blower has a spinner cap that is aerodynamically balanced to insure smooth, vibration-free, high-speed operation. Drive shaft, pulley, belts and sealed bearings are totally encased. Blowers may be installed vertically or horizontally. Blower is made in a range of sizes and capacities from 14 in. upward.

For More Details Circle No. 11—Page 209

Sampling Gun: Laboratory Equipment Corp., St. Joseph, Mich.—Pistol-shaped sampling gun is for use in sampling molten ferrous and nonferrous metals and alloys. A piece of Pyrex tubing is inserted into the

gun barrel, and the unit is cocked. Tube is dipped into the melt and trigger pulled. Sample is sucked into the tubing where it solidifies. Tubing is broken away, revealing the sample which can be broken or cut to length for weighing and subsequent chemical analysis. Sample is said to be free from oxidation and has a shiny surface. Length to which the sample is drawn into the tube is governed by an adjusting device controlling the length of the piston stroke.

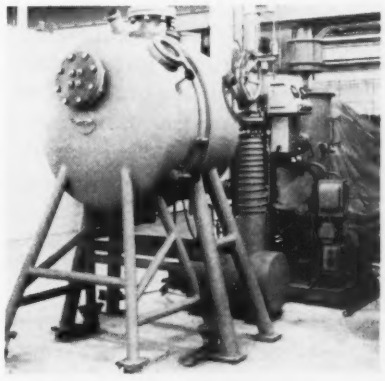
For More Details Circle No. 12—Page 209

Photoelectric Pyrometer: Photoswitch Division, Electronics Corp. of America, Dept. P153, 77 Broadway, Cambridge 42, Mass.—Photoelectric pyrometer for industrial use makes possible precise monitoring and control of temperatures of hot materials. Control operates from amount of infrared radiation emitted from the hot object. As radiation increases proportionally with the tem-

Laboratory High-Vacuum Furnace Is Versatile

LABORATORY high-vacuum furnace of 5 to 50 lb capacity is for investigating the effect of high-vacuum processing on old and new high-temperature alloys. Vacuum pumping is provided by a two-stage diffusion ejector pump to create low pressures of 10^{-4} mm Hg required for a gas-free atmosphere and is said to provide ample capacity for handling pressure surges that occur during alloy additions and pouring. General process observations, alloy additions, tilt pouring, crucible temperature measurement, bridge breaking, pressure readings and high frequency controls are located to permit operation of the unit from one spot.

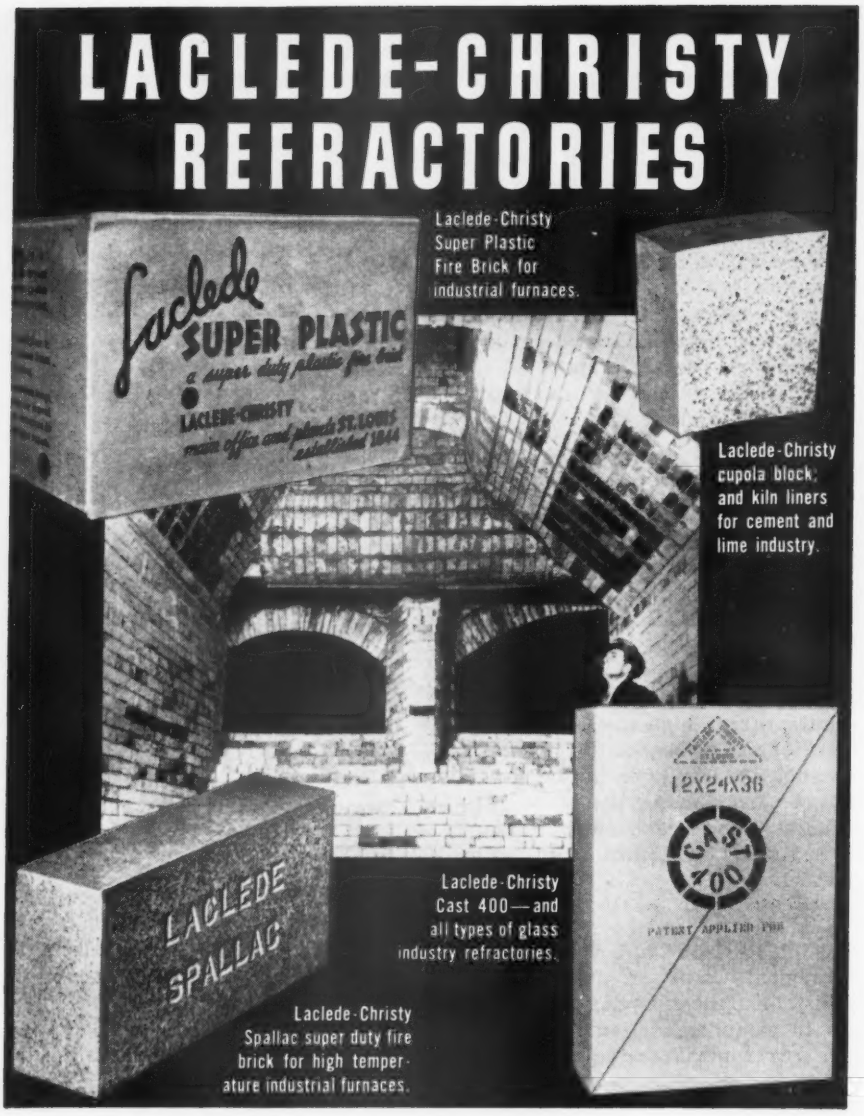
Induction heating unit is permanently mounted and positioned so that the crucible can be charged with the chamber open or through an overhead port with the chamber closed. Five crucible



sizes to accommodate melts of 5, 12, 17, 30 and 50 lb are available. Three high-frequency power supplies are adaptable to the furnace with 4200 cycles per second recommended for general use. The furnace is manufactured by Consolidated Vacuum Corp., 1775 Mount Read Blvd., Rochester 3, N. Y.

For More Details Circle No. 13—Page 209

LACLEDE-CHRISTY REFRACTORIES


Laclede-Christy Super Plastic Fire Brick for industrial furnaces.
Laclede SUPER PLASTIC
Laclede-Christy cupola block and kiln liners for cement and lime industry.
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Laclede-Christy Cast 400—and all types of glass industry refractories.
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Name your refractory needs

What do you want? Not just the correct refractory for your purpose, but fire brick, blocks or liners that deliver *more* than you expect. You want benefits that go with this kind of service—minimum furnace down time, long furnace life and economical output. You also may want engineering service and follow-through for on-schedule performance.

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Laclede-Christy refractories—for the purpose you name—meet your most rigid requirements. "Quality first" is supsupported by many, many record performances. Laclede-Christy service is quick and helpful. The extra engineering help you may need is here too—at

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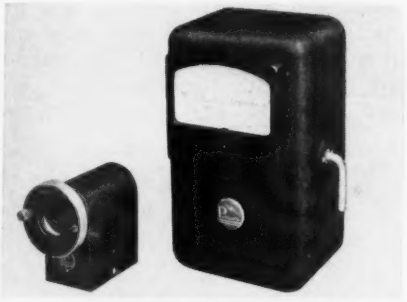
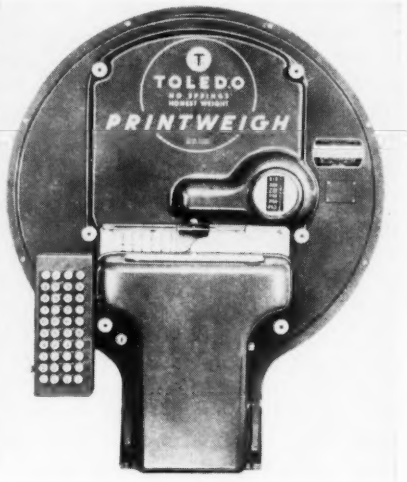
perature, a constant indication is given of the heat of the material being scanned. Manufacturer reports that no part of the equipment touches the hot object, making the system adaptable for measuring temperature of objects that are moving, or are surrounded by induction heating coils, or are in any way difficult to measure by conventional means.



For More Details Circle No. 14—Page 209

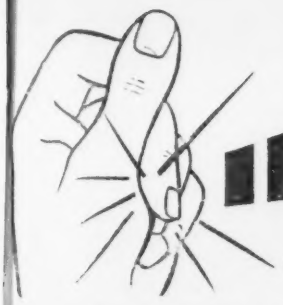
Weight-Count Scales: Toledo Scale Co., Toledo 1, O.—Scales that count hundreds of parts accurately can now print both the weight and the count. Counting scales, equipped with selective numbering equipment, permit the printing of any count up to 9999, simultaneously with the weight figure. Reported advantages are time saving, count recording on a fast-action keyboard, and printing of weight and count at touch of the control button. Units with selective numbering are available for bench, portable, floor, and built-in counting scales.



For More Details Circle No. 15—Page 209

Welders' Goggle: Pennsylvania Optical Co., Reading, Pa.—Welding goggle admits an indirect flow of air to the inner cup area through air passages in the side shields, but placement and angle of the inner cup prevents light penetration. Additional ventilation through channels between lens retaining rings and cupwalls provides a direct flow of air to inner

(*Continued on page* 211)



IDEAS FOR FOUNDRYMEN

HERE ARE QUICK REVIEWS OF NEW LITERATURE—available to foundrymen as "idea" and reference information. Readers in the United States and Canada may obtain copies by using the attached cards. Readers in foreign countries should write direct to the manufacturer offering literature.

81. Patterns

City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.—Production of patterns from masters to completed equipment is illustrated in booklet. Facilities for the production of wood and metal patterns, nonferrous castings and machine work are described. Foundry, laboratory, machine shop and shell molding operations are pictured.

82. Induction Melting

Inductotherm Corp., 620 East Glenolden Ave., Glenolden, Pa.—High-frequency induction melting and heating equipment are described in bulletin 60. Featured in the bulletin are two melting charts which simplify the selection of the proper size unit. Both tables are based on the choice of size and capacity of equipment by selecting desired melting times.

83. Hardness Tester

Torsion Balance Co., Clifton, N. J.—Bulletin describes the manner in which a new hardness tester performs tests in both the superficial and regular ranges of Rockwell hardness testing. Features illustrated are a dial gage, a load selector and a diamond cone indenter for C and N scale testing.

84. Space Heaters

Dravo Corp., 1203 Dravo Bldg., Pittsburgh 22, Pa.—Brochure describes eight metalworking applications where warm air space heaters are used to temper large volumes of fresh make-up air for plant ventilation and to facilitate the venting of toxic and noxious fumes, odors and dust.

85. Adjustable Ramps

Rowe Methods Inc., 2534 Detroit Ave., Cleveland 13, O.—Complete engineering details and other information concerning the use and installation of hydraulic adjustable ramps are given in a new booklet. Two types of dock equipment are described. One is installed at loading platform height and provides a continuous automatic connection between the dock and the base of a truck or rail car, the other is installed at ground level to adjust the rear wheels of a truck to maintain a continuous flush connection between the vehicle's floor and the loading platform.

86. Overhead Cranes

Whiting Corp., Harvey, Ill.—Data on classes of crane service, crane ratings and capacities and recommended speeds for bridge, trolley and hoist, along with standard dimensions and clearances are given in a new bulletin "How to Select an Overhead Crane." Also mentioned are the 14 minimum crane safety features, information on motors, controls and gear drives.

87. Oil-Air Regulator

Hauck Mfg. Co., 124-136 Tenth St., Brooklyn 15, N. Y.—Automatic oil-air ratio regulator for industrial burners of the two-air connection type is covered in bulletin 722. Oil capacities are given, the control system is diagramed, operation is described, an illustrated parts list is included and dimensions are given by an engineering drawing.

88. Scraper Hoists

Ingersoll-Rand, 11 Broadway, New York 4, N. Y.—Line of air and electric hoists for handling bulk materials of all types is described in catalog 5300A. Features of each type and size are outlined along with specifications, capacities, sizes, symbols and accessories available.

89. Dust Collector

American Air Filter Co., Louisville 8, Ky.—Dry centrifugal dust collector is shown in bulletin 291. Operational features and dimensions are included.

90. Welding

Metal & Thermit Corp., 100 East 42nd St., New York 17, N. Y.—Complete set of literature describes electrodes for arc welding as well as rods and wire for gas, submerged arc and inert arc welding. Specific catalogs

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cover electrodes for mild and low alloy steel, coil wire for submerged arc welding, stainless steel electrodes and bare wire, aluminum electrodes and bare wire, electrodes for cast iron, gas welding rods and tungsten rods.

91. Silicones

Dow Corning Corp., Midland, Mich. —New catalog, "1955 Reference Guide," lists some 23 new products besides the 100-odd mentioned in the previous issue. An application index of 21 classifications enables engineers to locate a product by what it does rather than by what it is. Comparable data on various silicone products and the organic materials they displace are given to permit preliminary evaluation.

92. Carbon Potential

Surface Combustion Corp., Advertising Dept., Toledo, O.—Bulletin SC-168 describes how the carbon potential of heat treat furnace atmosphere may be controlled at the desired level for such processes as case carburizing, homogeneous carburizing, carbon restoration and clean hardening. The methods discussed are applicable to continuous and batch type heat treat furnaces.

93. Pattern Alloys

Cerro de Pasco Corp., 40 Wall St., New York 5, N. Y.—Bulletin F6 describes the use of low melting temperature alloys of bismuth and lead in patternmaking. Melting temperatures and dimensional stability figures are given. Metalizing of wood patterns, sealing of blow coreboxes and alteration and repair of matchplates are pictured.

94. Dielectric Heating

Allis-Chalmers Mfg. Co., 1032 South 70th St., Milwaukee, Wis.—Operating advantages of dielectric heaters are given in a four-page illustrated bulletin, 15B6431B. Physical size, output and input of various types of dielectric heaters are given in a table.

95. Magnetic Pulley

Homer Mfg. Co., Dept. 156, Lima, O. —Permanent magnetic applications and features are described in illustrated bulletin, PY-260. The eight-page bulletin includes diagrams, performance data, specifications and a guide for selecting the proper size.

96. Molybdenum

Climax Molybdenum Co., 500 Fifth Ave., New York 36, N. Y.—Informative booklet tells the sources, production capacity and uses of molybdenum. A graph gives yearly production of molybdenum since 1910.

97. Rubber Products

Quaker Rubber Corp., Division of H. K. Porter Co., Tacony and Comly St., Philadelphia 24, Pa.—New 58-page case-bound general catalog on industrial rubber products is divided into sections for quick reference. There are sections on belting, hose, packing and molded rubber products. Performance data, specifications and sizes are included in all sections. A special section gives information on belting construction.

98. Vacuum Furnace

Naresco Equipment Corp., 160 Charlemont St., Newton Highlands 61, Mass.—New 30-lb induction-heated vacuum furnace available with either a vertical or horizontal shell is described in a new catalog. Also described are induction, resistance and arc furnaces.

99. Materials Handling

Clark Equipment Co., Industrial Truck Division, Battle Creek, Mich. —Condensed catalog pictures lift trucks and their attachments, electric hand trucks, towing tractors, bulk trucks and carrier trucks. Tables give capacities, dimensions and performance features of the various models.

100. Research

Sam Tour & Co., 44 Trinity Place, New York 6, N. Y.—Facilities for research, development and consulting in the fields of chemical, metallurgical, mechanical and nondestructive testing are described in a folder designed to introduce the company.

101. Sling Handbook

Union Wire Rope Corp., 21st and Manchester Ave., Kansas City, Mo. —Large, 50-page manual gives information on braided wire fabric slings including types, dimensions, weights and safe loads. Directions for splicing are included.

102. Casting Impregnation

Seal Cast Co., Dept. F-3, 211 East York St., Philadelphia 25, Pa.— Brochure discusses three methods of porous casting impregnation. Illustrations and photos are used to describe techniques now being used to recover porous castings.

103. Industrial Ovens

Jensen Specialties Inc., 9331 Freeland Ave., Detroit 28, Mich.—Industrial process heating oven using radiation for raising product temperature and convection for holding the required temperature is described in a 16-page brochure.

104. Blocks and Sheaves

American Hoist & Derrick Co., St. Paul 1, Minn.—Wire rope blocks and sheaves are described in catalog 300-24 A. Various types are illustrated, tables are included and a way to figure line parts is given.

105. Core Box Vents

C. M. Smillie & Co., 1120 Woodward Heights Blvd., Ferndale 20, Mich.— Slotted vents for coreboxes, inserting drill for core vents and vent cleaner are covered in an illustrated folder.

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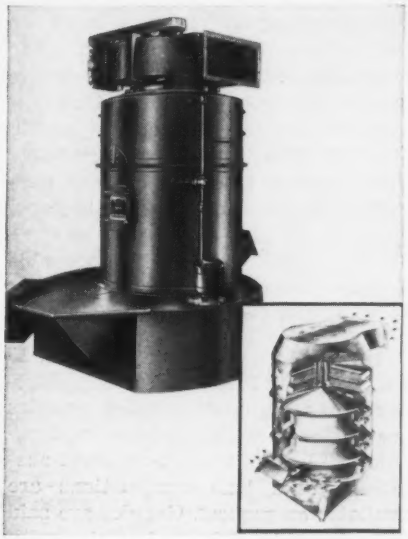
Serving Industry Since 1883

(*Continued from page* 208)

lens surface. Metal reinforcing rings molded into the inner ring of the cup insure retainment of original cup thread dimensions under all conditions. Brown opaque thermoplastic goggle is equipped with standard 50 mm size welding lenses and cover glass.

For More Details Circle No. 16—Page 209

Dust Collector: Van-Truer Co., 12600 Beech Rd., Detroit 23, Mich.—Wet type fume and dust collector consists of a cylindrical drum with a series of cones and baffles. Water cascades downward within the collector. This produces a series of closely related water curtains through which



dust-laden air is filtered in its upward travel. A double row of moisture eliminators are mounted above the washing chamber. Access doors are provided in the housing for inspection of eliminators and wash chamber. Baffle design sets up a cyclonic washing action and turbulence, separating the wet dust and carrying it to the sludge tank below. Saturated air continues up through two-stage moisture eliminator before emerging. Design incorporates a flat bottom which serves as a settling tank from which water is recirculated. A chute type of cleanout is provided. Models are engineered for truss-suspension, floor-setting, or erection on roofs.

For More Details Circle No. 17—Page 209

Valve: Ross Operating Valve Co., 120 East Golden Gate, Dept. R2101, Detroit 3, Mich.—Remote controlled valve is a four-way, base-mounted, pressure-operated model adaptable to industrial applications. It is controlled by air from a remote pilot valve which may be hand, foot, cam or solenoid actuated. Actuation and reversal are immediate. Standard models include side ports, ¼ through ¾-in. pipe sizes. The 1 and 1¼-in. sizes are bottom ported. Main valve pres-

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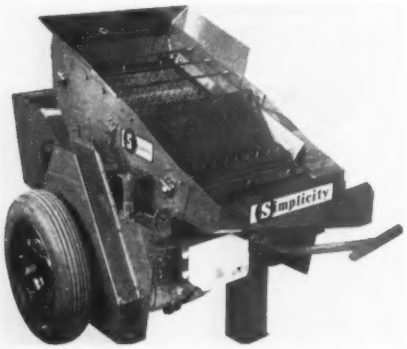
sures can go to 125 psig. Pilot air pressures may be equal to or greater than main valve pressures but not less than 30 psig. Operating temperatures can go up to 175° F.

For More Details Circle No. 18—Page 209

Lifting Magnet: Electric Controller & Mfg. Co., 2700 East 79th St., Cleveland 4, O.—Lifting magnet is 45 in. diam and weighs 3200 lb. It is designed to speed up material handling on scrap yard boom cranes. Magnet is said to lift 95 per cent or more of established capacities and has a fast discharge time. Company has a wide selection of lifting magnets from 12 to 80 in. diam.

For More Details Circle No. 19—Page 209

Sand Conditioner: Simplicity Engineering Co., Durand, Mich.—Portable foundry sand conditioner is equipped with large pneumatic tires for easy movement on uneven or sand foundry floors. It screens, aerates and fluffs foundry sand in one operation. Unit will handle 10 to 15 tons of



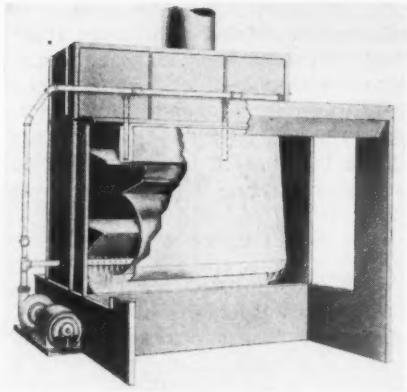
sand per hour or if fed manually, all the sand two men can shovel. Sand is fed directly on the screen. All lumps and balls are broken down. Hard core butts, chills, gaggers and nails pass over screen into a vibrating scrap chute and are fed off into a receptacle. Good sand is screened, aerated, fluffed and thrown into heaps ready for the molder. Distance to be thrown and height of heap is regulated by an adjustable hood over the aerator. Shoveling height is 37 in., overall width 53 in. and overall length 60¾ in.

For More Details Circle No. 20—Page 209

Air Valve: Mechanical Air Controls Inc., 10030 Capital, Oak Park, Detroit 37, Mich.—Four-way solenoid-operated spring-return air valve is enclosed in cover to protect both the solenoid and valve against dirt, dust and water. Unit measures 3¼ x 6¼ x 2¾-in. wide. Cover is gasket sealed with locked-in screws.

For More Details Circle No. 21—Page 209

Paint Spray Booth: Despatch Oven Co., 619 Eighth St., S. E., Minneapolis 14, Minn.—Water spray paint booth is claimed to be practically 100 per cent efficient in removing paint particles from exhaust air. Unit uses a baffle type chamber to provide a cleaning action that prevents paint pigments and volatiles from reaching the exhaust stack or the outside of the building. Air scrubbing chamber features a spray header that sprays water in three directions against two curved baffle plates, building up a spray turbulence that removes practically every particle of paint. Construction is panel type of 18 gage steel with formed channel edges. Interior is accessible without tools.

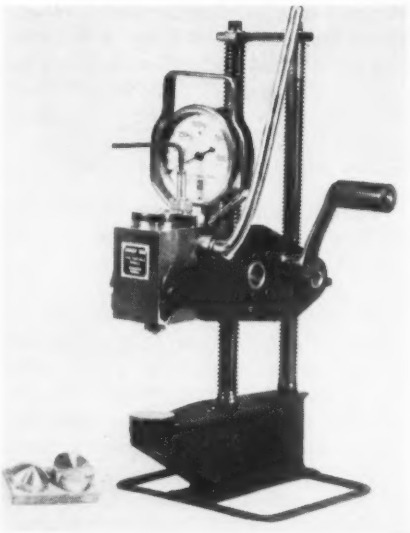


For More Details Circle No. 22—Page 209

Goggles: Welsh Mfg. Co., 15 Magnolia St., Providence, R. I.—Rubber mounted, multipurpose goggles are designed with one-piece replaceable 040 lens of impact-resistant acetate. Special lens compositions are available on request. Goggles are said to incorporate wide-angle vision with comfort as strap terminals are out of line of sight. Manufacturer reports the goggles are particularly effective for use in shakeout operations.

For More Details Circle No. 23—Page 209

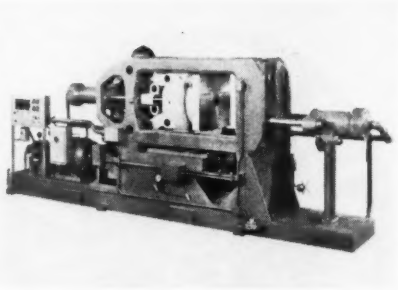
Portable Tester: Andrew King, 67 East Lancaster Ave., Ardmore, Pa.—Light-weight, portable, hardness tester is guaranteed to make accurate brinell tests on nonferrous alloys of all kinds. A removable test head



makes it possible to test parts of any size or shape, in any position, with or without the base. It can be set to pop off at 62½, 125, 250, 500, 750 and 1000 kg. A narrow and shallow nose at the anvil permits the unit to be used in small, cramped spaces, tubes or cylinders. Dimensions are: Throat 4 in. deep and gap 10 in. high. Weight is 26 lb.

For More Details Circle No. 24—Page 209

Die Casting Machine: Lester-Phoenix Inc., 2711 Church Ave., Dept. N-14, Cleveland 13, O.—Aluminum die casting machine can cast up to 6⅜ lb of aluminum or proportionate weights of magnesium or brass. In the shot assembly the machine provides 21,000 psi maximum pressure on metal. Both shot speed and pressure are adjustable. Preload clamping of 400 tons is made possible by a one-piece alloy steel frame which also insures permanent parallel alignment of the platens. Die opening is 12 in. Movable platen is 28 in. wide with a vertical clearance between beams of



26 in. Pumping system uses a 20-hp motor and includes a 2000-lb booster pump.

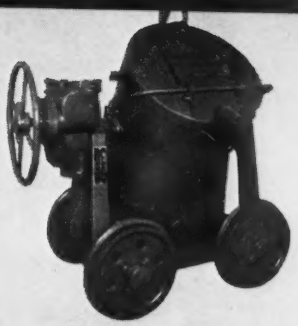
For More Details Circle No. 25—Page 209

Industrial Buildings: Marietta Concrete Corp., Marietta, O.—Preplanned and predesigned industrial and commercial buildings use structural steel and precast concrete to provide a permanent, attractive, durable structure that can be erected in a minimum of time, according to the supplier. Precast concrete wall panels, mounted on rigid steel frame, are said to be weathertight and are available with or without cast-in insulation. Steel frame design provides an interior free from columns and trusses. Floor area is clear from wall to wall and end to end.

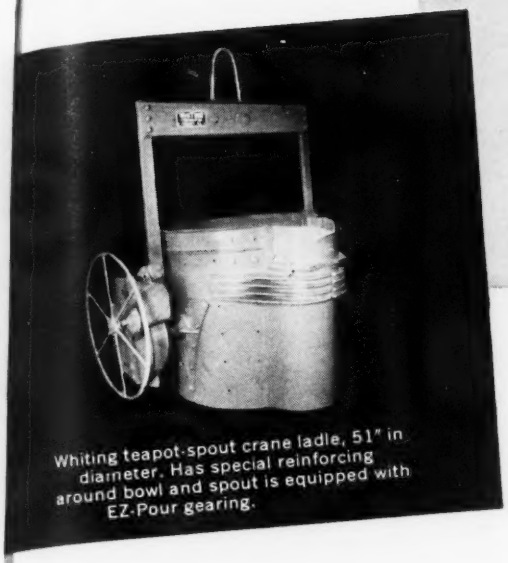
For More Details Circle No. 26—Page 209

Powered Vacuum: American Cleaning Equipment Corp., 2029 South Halsted St., Chicago 8, Ill.—Industrial vacuum cleaner, powered by two motors, uses a 3-in. ID hose to pick up heavy bulk materials. Cleaner is designed for picking up large amounts of water and can be used for cleaning out sumps. Tank is equipped with a dump valve to ease

(*Continued on page* 214)



Whiting standard 26" ladle and truck, equipped with EZ-Pour gearing and insulated cover. Has closed standards and no bail. Truck has 16" dia. wheels for 24 gauge track. Other gauges available.



Whiting teapot-spout crane ladle, 51" in diameter. Has special reinforcing around bowl and spout is equipped with EZ-Pour gearing.

Equipped with V bail, this Whiting cylindrical ladle is 28" in dia. by 33" long. Also has sliding type cover with adjustable lever and EZ-Pour gearing.

SPECIALLY ENGINEERED LADLES for special service

SPEED POURING... CUT COSTS!

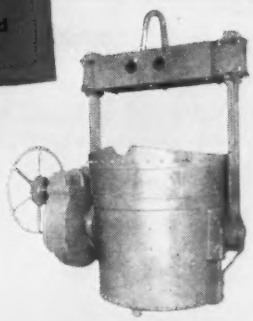
Whiting knows ladles. Proof is the thousands of Whiting ladles in use . . . *reason* is Whiting's 70 years' experience building these ladles. That's why Whiting can give you the ladle you want and need. That's why Whiting's special engineering service means the best possible performance at the lowest possible cost.

For example, take a look at the specially engineered Whiting ladles shown on this page . . . only a few of many designed for specific applications. With such special features as structural steel spouts, riveted or welded heads and extra reinforced bowls, they withstand the toughest day-in-day-out, year after year service.

Remember, too—in addition to the "specials", Whiting carries a complete line of standard ladles . . . all known for their longer-lasting, economical performance. They include hand and shank ladles, covered trolley ladles, covered crane ladles, riveted crane ladles, geared and non-geared bottom-top ladles, cylindrical ladles, mixing and reservoir ladles.

Send today for complete information on all Whiting Ladles!

Whiting 27" by 90" U-Ladle with oil fired lining preheater and motor operated gear bracket.



Whiting special 66" top diameter square bail combination lip and bottom pour ladle with laminated bail arms and heat shield, anti-friction trunnion bearings and helical worm gear bracket.

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- ☐ Send Me A Whiting Ladle Catalog
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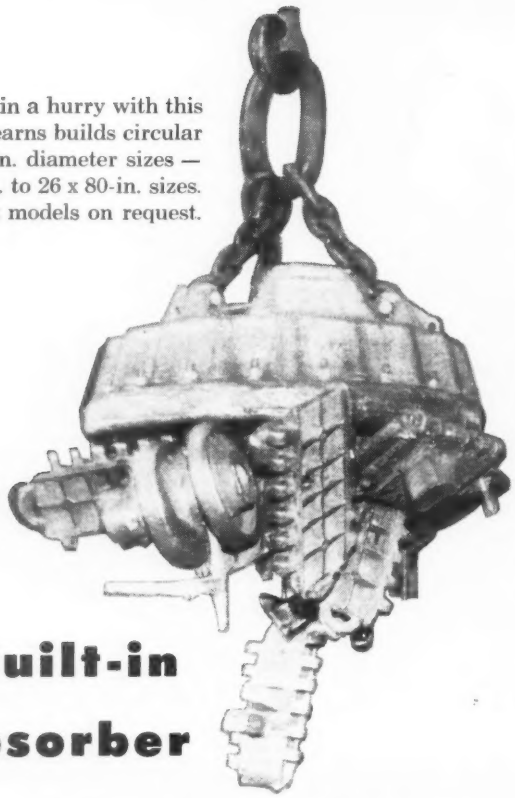
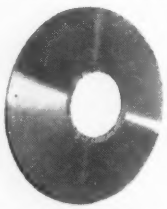
Bulky castings are moved in a hurry with this lifting magnet. Stearns builds circular models in 20 to 65-in. diameter sizes — rectangular in 9 x 24-in. to 26 x 80-in. sizes. Custom-built models on request.



Exclusive Built-in Shock Absorber

PROTECTS DEEP-DOWN PULLING POWER



Heavy bronze coil cover provides cushion against shocks and jars.

Powerful, deep-field Stearns lifting magnets are built with an extra wall of protection against shocks and jars. In addition to the regular coil shield of chrome-nickel steel, Stearns adds a heavy bronze coil cover — an *exclusive* feature.

This shock-absorbing cover provides a double advantage — it is both ductile and tough. It not only absorbs jolting impacts when the magnet is banged against sharp, hard objects — it is strongly resistant to damage.

Find out *all* the ways Stearns protects deep-down pulling power — gives you long life, profitable lifting magnet operation. See your Stearns representative or write for your copy of Bulletin 35-B-1. 1075

MAGNETIC EQUIPMENT FOR ALL INDUSTRY

STEARNS MAGNETS

STEARNS MAGNETIC, INC. 662 S. 28th St., Milwaukee 46, Wis.

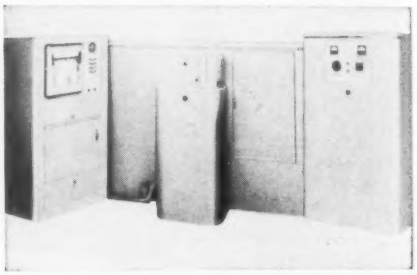
(*Continued from page* 212)

(add cut)

emptying of liquids. Dolly is fitted with neoprene rubber casters. Two dust bags are used to provide a filter area to keep suction at top level on heavy cleaning jobs.

For More Details Circle No. 27—Page 209

Quantometer: Applied Research Laboratories, Glendale, Calif.—Simplified production control quantometer is modified for those companies



who have need for regular but limited spectrochemical analysis, or those who wish to start minimum laboratories and expand them later. Basic instrument has many automatic features of larger units removed for economy. It will analyze 11 elements. Expansion of the equipment's range is accomplished by addition of prebuilt units to the chassis. Completely automatic controls may be added on the same chassis.

For More Details Circle No. 28—Page 209

Hardness Tester: Steel City Testing Machines Inc., 8817 Lyndon Ave., Detroit 38, Mich.—Hydraulically operated brinell hardness testing

machine uses three colored lights to signal relative hardness of the test piece. When tied in with some means of automatically handling parts on a production line basis, unit can be made to sort work and thus make possible automatic brinell hardness testing. Signal lights are set so that yellow indicates "too hard," green designates "within range," and red shows "too soft." Limits are adjust-

(*Continued on page* 216)

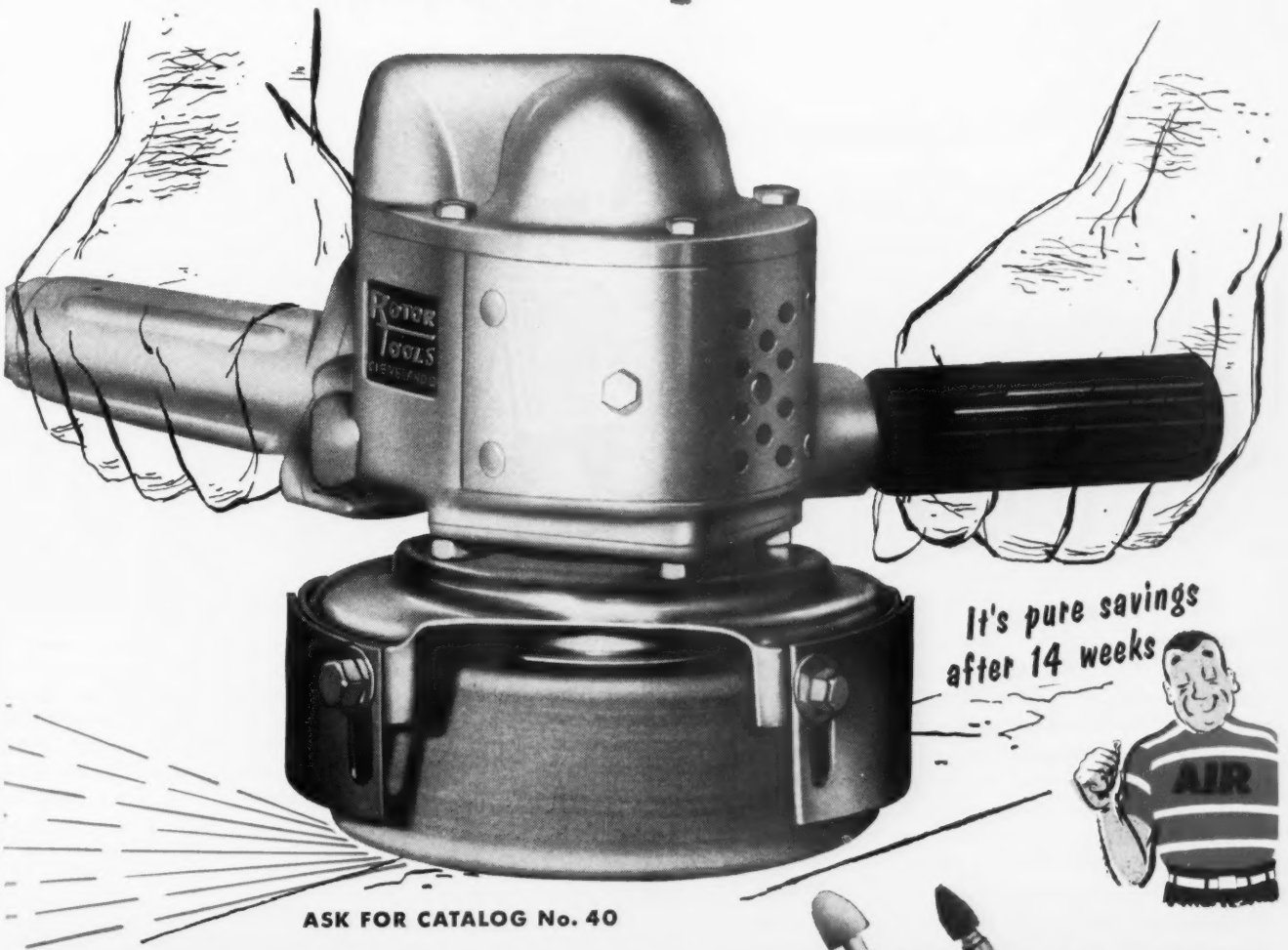
NEW Rotor B-35 Vertical Air Grinder PAYS FOR ITSELF IN 14 WEEKS

Job: Grinding surface defects on castings. Formerly used 3600 rpm electric grinders.

Now: Rotor Application Engineer suggested switching to new Rotor B-35 Vertical Grinder at 6000 rpm with a harder wheel.

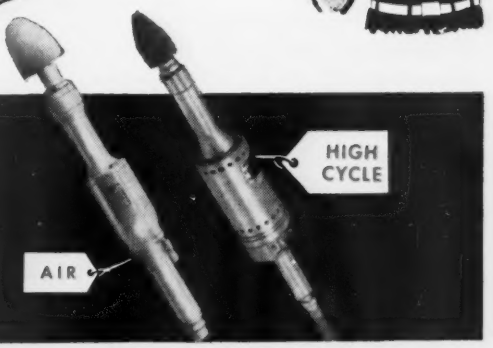
Results: Saves 8 minutes per casting . . . 40% more output with 60% use factor. Savings paid off tool in 14 weeks. Wheels last longer. Cuts operator fatigue.

See how-*you* can step up output with new Rotor tools! Ask for demonstration on your job.



ASK FOR CATALOG No. 40

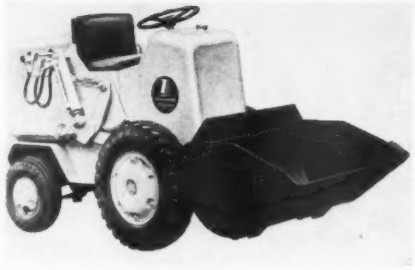
THE ROTOR TOOL CO.
CLEVELAND, OHIO
UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS



(*Continued from page* 214)
able to suit requirements. Units with 6 and 10-in. throat depths are available. Both have 14-in. maximum vertical openings.

For More Details Circle No. 29—Page 209

Tractor Shovel: Frank G. Hough Co., 703 Seventh St., Libertyville, Ill.—New model tractor shovel has a payload capacity of 18 cu ft and a struck load capacity of 14 cu ft. Bucket arm design permits breakout action of the bucket and 40 degrees of tipback. Design reportedly makes it possible to carry heaped loads at



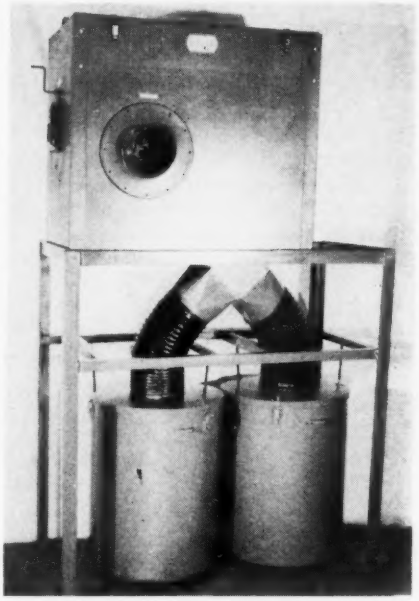
a lower level to provide stability and improved operator vision. A hydraulic accumulator is claimed to minimize load shocks and stabilize the hydraulic controls. A sealed and pressurized hydraulic system has been incorporated and double-acting rams operate the boom arms and the bucket.

For More Details Circle No. 30—Page 209

Hydrogen Electrode: Alloy Rods Co., Lincoln Highway West, York, Pa.—Iron powder has been incorporated into coating of low hydrogen electrodes to make possible use of higher welding currents with either direct or alternating current. These higher currents are said to increase the number of pounds of weld metal deposited per hour. Electrodes are available in strength levels and chemistry of the 7016, 8016, 9016, 10016, and 12016 AWS grades.

For More Details Circle No. 31—Page 209

Dust Collector: Aget Mfg. Co., Adrian, Mich.—Redesign of one of the company's dust collectors has resulted in reduction of unit's overall height, an increase in capacity and



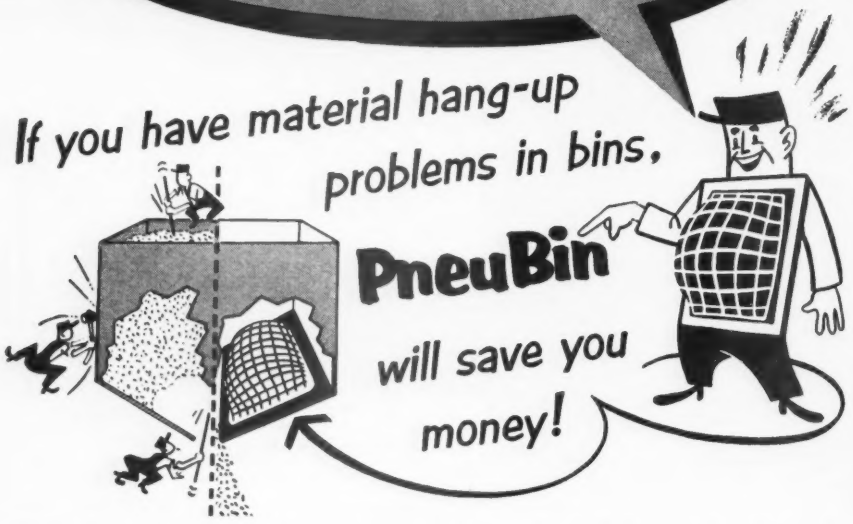
easier maintenance with a cleaner, more airtight system, according to the manufacturer. Dust bin has been replaced by roller cans, whose lids are held in place during operation by three clamps. An all-metal, flexible, "Y" diversion tube allows filtered dust, shavings, chips or lint to drop directly into the collecting roller cans.

For More Details Circle No. 32—Page 209

Audiometer: Beltone Hearing Aid Co., 2900 West 36th St., Chicago, Ill.—Audiometer is said to assure reliable and simplified hearing tests by industrial firms. Instrument can test individuals or up to 40 persons at one time. Unit is portable, weighing less than 11 lb, and uses one tube and one voltage regulator. Readings taken from the instrument can provide records of workers' hearing ability to

(*Continued on page* 218)

PULSATING PANELS
eliminate flow stoppage in bins!



PneuBin will solve your flow stoppage problems and reduce your operating expense. The PneuBin unit consists of steel-backed, neoprene, pulsating panels mounted on the inside wall of your present bins and air controls to regulate the panels' action. By the pneumatic inflation and deflation of the PneuBin panels, the bin contents are positively displaced to insure free flow. After the panels have deflated, the air control unit (operating off the regular plant air supply) starts another cycle of inflation and deflation. The process continues *automatically* at whatever frequency is set on the air controller (this frequency is adjustable).

PneuBin decreases plant operating costs by reducing maintenance, insures constant material flow to production lines and greatly increases personnel efficiency through its quiet operation.

Send for "Flow Stoppage Report" and FREE literature. PneuBin engineers will gladly make recommendations with no obligation on your part.

PneuBin

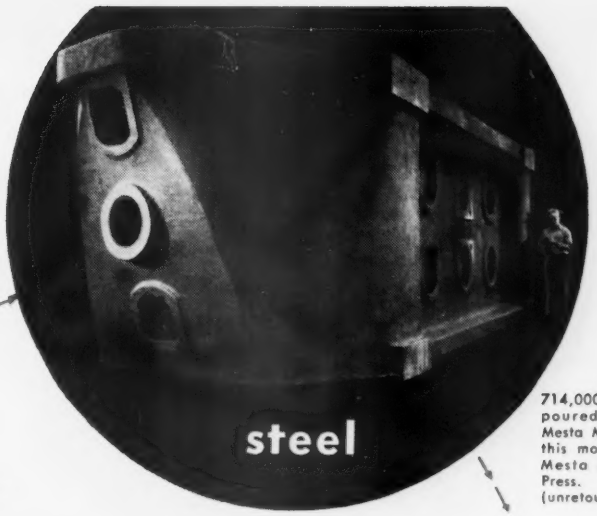
A PRODUCT OF
GEROTOR MAY CORPORATION
1533 Maryland Ave., Baltimore 3, Maryland

Thiem Krome Kote

CORE & MOLD COATING

gives you

versatility... unlimited!



714,000 lbs. of cast steel poured in the foundry of Mesta Machine Co., to make this moving crosshead for a Mesta 50,000 Ton Forging Press.
(unretouched photograph)

Cores for pump impellers by Fairbanks, Morse & Co., Kansas City Plant.
(unretouched photograph)

V-8 engine blocks — leading automobile manufacturer.
(unretouched photograph)

Whether it's heavy pit in steel, or high production grey iron or non-ferrous, Thiem Krome Kote plastic core and mold coating is TOP PREFERENCE with foundries for producing smooth casting surfaces at lower cost.

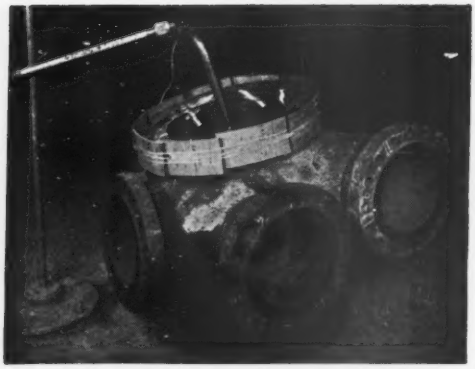
Suppose you're pouring a 714,000 pound steel casting like the moving crosshead for a hydraulic forging press, or motor blocks requiring high production or nonferrous pump impellers, shown above . . . what's your choice in a core and mold coating? You'll find foundrymen everywhere will say Thiem Krome Kote is your best bet! *Here's why:* it has excellent penetration to produce a deep, firmly anchored coating that prevents metal erosion and spalling defects — economical, too, because it's concentrated and uniformly covers more surface area — produces a smooth casting surface and cuts cleaning cost. WRITE TODAY — get all the facts!

Thiem

SOLD WITH SERVICE

PRODUCTS, INC., MILWAUKEE 14, WISCONSIN

Manufacturers of foundry products exclusively — Ferro Kote • Krome Kote • Dri Lite • NF-100 • No Dri G-100 • Mold Lite • Krome Kote Z • Krome Kote NF • Core Oil • Mudding Compound • Chill Kote • Core-Hesive Core Paste.



Radiographing a flange on a heavy steel casting.

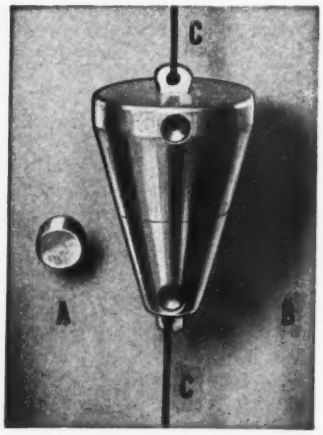
BUY . . . RENT . . . OR LEASE OUR RADIUM RADIOGRAPHY KIT

. . A Short cut to more productive and economical foundry practice

The use of gamma rays in radiographing steel castings has greatly increased since 1930, when the first commercial use of radiography was introduced. Radium radiography is simple, economical and effective; because it may be rented or leased, the equipment doesn't require a capital investment. It is simple to operate because it doesn't require especially skilled operators. Today radium radiography is rapidly approaching the status of standard equipment in progressive steel foundries. Let us tell you more about the simplicity and economy of radium radiography. Write today for prices, terms and case histories. Your requirements promptly supplied.

RADIUM CHEMICAL CO., INC.

161 East 42nd St., N. Y. Chicago: Marshall Field Annex Bldg. Los Angeles: 3974 Wilshire Blvd.



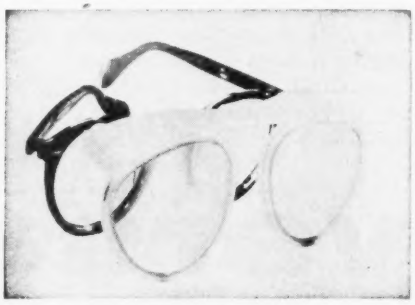
The apparatus is as simple as
A—small radium capsule
B—cartridge container
C—rigid string support

(*Continued from page* 216)

help determine whether impairment has been incurred or heightened on the job. Periodic checks can lead to changes in job assignments before permanent damage to the ear has taken place.

For More Details Circle No. 33—Page 209

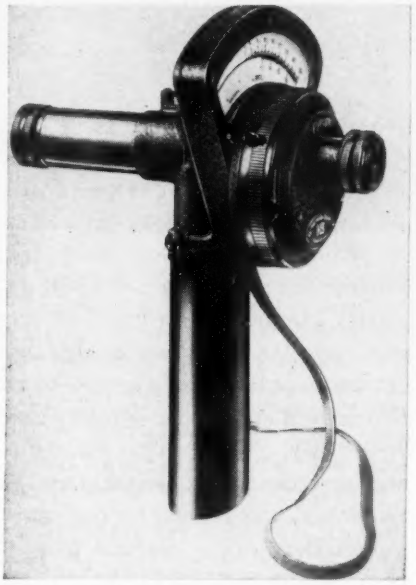
Clip-On Lenses: Watchemoket Optical Co., 232 West Exchange St., Providence 3, R. I.—Lightweight polyethylene frame provides shatter-



proof lenses that snap on or off prescription frames. They are held in place by plastic clips which do not scratch frame or lenses. A visor provides over-eyes protection to block out particles, dust, glare and perspiration. Two sizes are available to fit all prescription glasses frames. Lenses are available in light or medium green, and the frame can be had in translucent white or green.

For More Details Circle No. 34—Page 209

Optical Pyrometer: European Products Importing Co., 154 Nassau St., New York 38, N. Y.—Imported

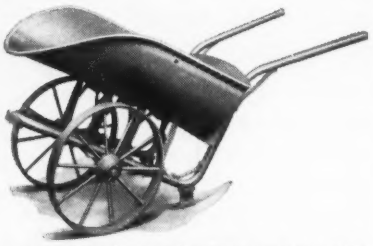


partial radiation optical pyrometer is used for measurement of temperatures of glowing masses in annealing, hardening and calcining furnaces, of molten or flowing metal, of red hot ingots when forging, pressing or rolling. It can be used also for testing thermoelectric pyrometers. Instru-

(*Continued on page* 220)

FORWARD DUMP BARROWS for FOUNDRIES

No. 102-A Barrow. Single steel wheel with 2" face, 16" diameter and 12 spokes.



No. 113-A Barrow. Two steel wheels with 2" face, 18" diameter and 10 spokes.

Here are two well-balanced charging Wheelbarrows for heavy duty foundry service. Handle loads up to 1000 lbs. Sturdy, welded, all-steel construction. Single wheel or double wheel. Available with zero pressure cushion type wheels or 4 ply pneumatic tired wheels with roller bearings. Immediate shipment.

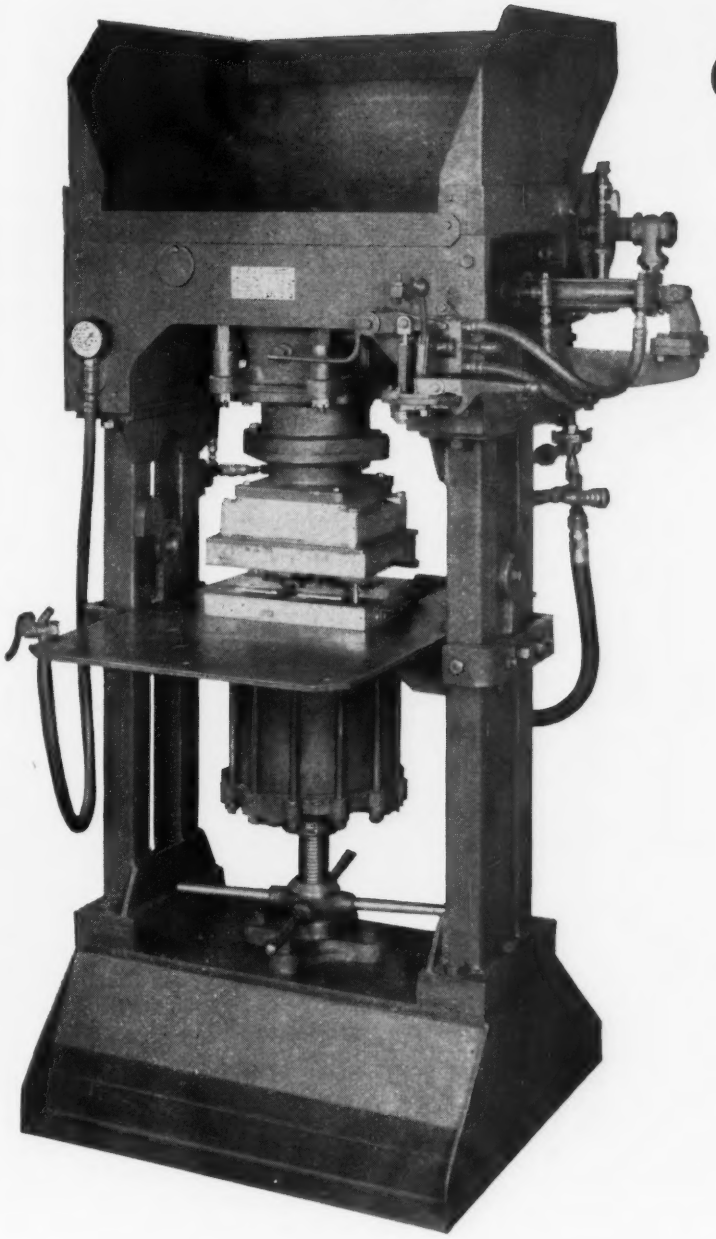
Write for Circular No. 58.

Sterling FOUNDRY EQUIPMENT

STERLING WHEELBARROW COMPANY • MILWAUKEE 14, WIS., U. S. A.

A 5792-½

Redford No. 4-D DRAW TYPE CORE BLOWER



Designed primarily to fill the need for a fast and flexible draw type machine to handle work from a few ounces to 10 lbs., the Redford #4-D can be quickly adjusted to accommodate core boxes not requiring the draw feature, or can be equipped with a clamp to handle vertically parted core boxes.

Rugged construction, simplicity of change-overs and a fast operating cycle make it suitable for either jobbing or high production work.

Exhaust air is utilized to thoroughly fluff the sand remaining in the sand magazine after each blow, thus reducing the possibility of cratering.

The stationary sand magazine and accurately guided draw table assure perfect drawing of the cores. Vibration of the core box is automatic.

Magazine heads normally furnished with the #2 Redford machine can be used with the #4-D Redford. Larger new type magazine heads especially suited for draw type work are also available as standard equipment.

Valves are designed to assure maximum safety. The operator must use both hands at the same time in order to clamp the core box.

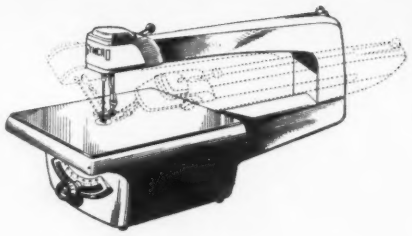
The Redford #4-D has been thoroughly proven in both small and large foundries. To get complete information write for Bulletin 4-D.

Redford IRON & EQUIPMENT CO.

20733 GLENDALE AVENUE • Phone KEnwood 1-8611 • DETROIT 23, MICHIGAN

(*Continued from page* 218)
ment is operated by a built-in storage battery and its range is from 1300 to 6300° F. It is manufactured by Hartmann & Braun AG, Frankfurt/Main, Germany.

For More Details Circle No. 35—Page 209



Tilting Jig Saw: Syncro Corp., Dept. P-2500, Oxford, Mich.—Self-powered, tilting arbor jig saw weighs 45 lb, has built-in blower, 20-in. throat clearance, a 12 x 15-in. working surface that gives a full 160-sq in. working platform. Blade can turn 90 degrees in any direction for rip cuts. Saw can be set for any angle of cut up to 45 degrees on either side of center by adjusting a calibrated dial knob. Power unit is guaranteed against burn out.

For More Details Circle No. 36—Page 209

MORE FOUNDRY PRODUCTION by

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OVENgineering*

* Ovens engineered to fit production need will result in more production and more foundry profits. This belief is supported by an ever increasing number of forward looking metalworking companies and foundries as they keep cost checks on Despatch "Ovengineering".

For 52 years Despatch has been designing, building and installing foundry ovens for the nation's leading foundries. They have developed many features and designs to speed baking of cores, to improve core quality, make better use of labor, to fit ovens in difficult floor space. In fact Despatch has developed "Ovengineering" to a science that will put new profits in core making in your foundry. Let us send you a copy of our Foundry Bulletin No. 31 or have a field engineer visit. He will tell you how Despatch Ovengineering will assist you in your foundry.

WRITE DEPT. N

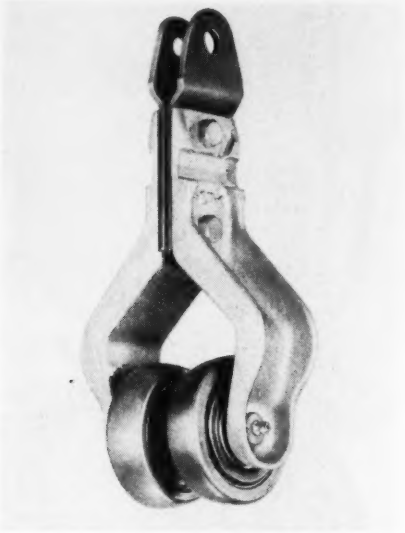
Minneapolis Office: 619 S. E. 8th St.
Chicago Office: 4554 N. Broadway

DESPATCH OVEN COMPANY

Electrodes: C. E. Phillips & Co., 2750 Poplar St., Detroit 8, Mich.—Bimetallic electrode with core of copper and mild steel with arc-shielding flux coating is for welding steel to cast iron. Deposit has a slightly copper color and is tough and ductile and resistant to shock, according to the manufacturer. The deposit can be peened and is free from cross checking. Electrodes are available in ⅛, 5/32 and 3/16-in. sizes. Applications include repair welding on all grades of iron castings, welding cast iron to carbon and alloy steels, welding heavy cast iron sections without studding and welding copper to cast iron. Process is not applicable when the deposit is machined at the line of fusion.

For More Details Circle No. 37—Page 209

Trolleys: Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.—New ball bearing trolleys for overhead conveyors are engineered to assure rolling contact with the track at all positions. Bearings with ball and cage assembly and concentrically ground raceways are said to keep friction at a minimum. Wheels are steel with machined and hardened treads.



Brackets are forged steel. A variety of seals can be furnished depending upon needs and conditions. Trolleys are designed for use on 3, 4 or 6 in. I-beams, with capacities of 300, 600 and 1200 lb. Two types are available: Bolted wheel and bracket assembly, and riveted. Four-wheel trolleys also are available for heavier loads.

For More Details Circle No. 38—Page 209

Paint: C. H. Dragert Co., P. O. Box 5092, Dallas, Tex.—Heat and weather resistant paint is formulated of silicone and atomized silver aluminum to resist up to 1600° F while repelling rust and corrosion. Manufacturer claims a single coat of the

(*Concluded on page* 222)

Foundry Sand Reclamation

One of the big factors of high production, low costs and simplicity of operation is the patented Denver Heavy Duty Sand Scrubber pictured, above, in Denver Sand Reclamation System. Bonding material on the surface of sand grains are removed by attrition of grains striking one another inside the scrubbers at high velocity in a water and sand mix.

Foundry Sand Costs Are Cut, Sand Disposal Problems Are Solved With Denver Sand Reclamation System

Denver Sand Reclamation offers foundries another means of cutting costs and increasing profits. One Denver Sand Reclamation System, at a foundry producing 400-tons of castings per month, saved the foundry $42,864.00 a year — that's $42,864.00 in added profits.

New Sand Use Cut 50%: During the first year, 1120 lbs. of new sand per ton of castings was used, compared with 2400 lbs. of new sand per ton of castings before Denver Sand Reclamation. Cost of the 1280 lbs. of reclaimed sand used per ton of castings, on this basis, is $1.20. Goal is to cut new sand use to 600 lbs.

Reclaimed Sand Makes Better Castings: The Denver Reclamation Systems are so effective that many molders prefer characteristics of reclaimed sand over characteristics of new sand. This is because the reclaimed sand is more stable. In addition to the dollar saving features of Denver Reclamation Systems, several foundries have installed systems to solve their problem of disposing used sand—80% to 90% recovery of sand is realized.

No Charge Sand Test: We would like to demonstrate what the Denver Sand Reclamation Process will do on your discarded sand. A 100 lb. sample is sufficient. There will be no charge or obligation for a preliminary sand test. We will return the cleaned sand for your inspection and analysis.

In order that we might have as much information as possible for this preliminary test, we would appreciate your writing us first, so we can supply you a questionnaire of data necessary to make the test. Remember, there will be no charge or obligation.

Find out how you can cut your foundry sand costs —solve used sand disposal problems! Write for the Sand Reclamation Test Questionnaire, today!

DECO FLOTATION ENGINEERS — DENVER EQUIPMENT COMPANY 24 HOUR SERVICE

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DENVER, NEW YORK, CHICAGO, EL PASO, SALT LAKE CITY, VANCOUVER, TORONTO, MEXICO, D.F., LONDON, JOHANNESBURG

(*Concluded from page* 220)

paint will protect for more than a year the hottest stacks, blistering boilers, steam pipes, engines, exhausts, manifolds and mufflers, irrespective of temperatures and exposures. It comes in pint, quart and gallon cans.

For More Details Circle No. 39—Page 209

Barrel and Drum Truck: Lewis-Shepard Products Inc., Watertown, Mass.—Hand truck features a pivoted wheel mounting which permits the operator to pick up and "break over" a drum without lifting either truck or drum off the floor. Truck is 23 in. wide and can handle drums or barrels 20 to 36 in. in diameter weighing up to 600 lb. Arc welded into a one-piece frame with tubular steel support members, it weighs 65 lb. Truck has roller bearing wheels.

For More Details Circle No. 40—Page 209

Welding Helmets: Jackson Products Inc., Warren, Mich.—Fiber glass welding helmets feature a nar-

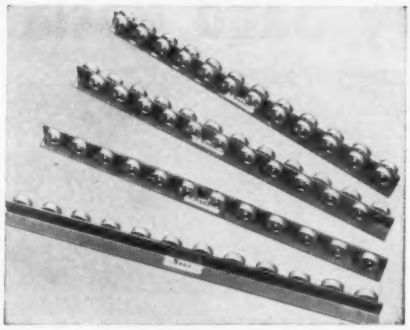
row front shape and are claimed to be heat and moisture resistant. Fixed-front and lift-front types are available. Sweatbands are cork padded. Friction pivots may be adjusted by hand while helmet is in use to hold it in any position or make it float down without jolting stops.

For More Details Circle No. 41—Page 209

Recorder-Controller: Robertshaw-Fulton Controls Co., Fielden Instrument Division, 2920 North Fourth St., Philadelphia 33, Pa.—Sensitive self-balance recorder-controller is for the measurement and control of levels of liquids, granular solids, interface and other conducting and nonconducting substances. Can also be used for other process variables such as moisture content or composition which cause a direct change in dielectric constant. Accuracy is claimed to be within ¼ of 1 per cent.

For More Details Circle No. 42—Page 209

Wheelrails: Sage Equipment Co., 30 Essex St., Buffalo 13, N. Y.—Company has added three wheelrails to its line of gravity conveying equipment to provide inside and outside mounting



as well as staggered and opposite positioning of wheels. Wheelrails can be arranged to suit width and weight of materials in various multiple combinations to meet varying requirements. They can be adapted to existing systems.

For More Details Circle No. 43—Page 209

Filter: Cambridge Filter Corp., 738 Erie Boulevard East, Syracuse, N. Y.—High efficiency filter for industrial air conditioning and ventilating system features a permanent, cadmium plated steel frame, which contains a completely assembled replaceable filter cartridge. Three different cartridges with different filtering media are available, providing efficiencies of 35, 85 and 95 per cent. Efficiencies are based on the National Bureau of Standards discoloration test, using atmospheric dust. Initial pressure drops for the various cartridges range from 0.16 to 0.35 in. w.g. Filter is manufactured in a standard capacity of 1000 cfm and in smaller capacities down to 125 cfm.

For More Details Circle No. 44—Page 209

Overload Protection: Morse Chain Co., 7601 Central Ave., Detroit 10, Mich.—Drive overload protection devices feature high-friction, wearproof friction disks and an adjusting nut locking arrangement. Drive component is mounted on a powdered metal bushing clamped between two friction disks by an adjustable spring. When drive is overloaded, sprocket or related component breaks away from clutch disks and

slips at from one half to one third the torque setting until motor is shut off and overload condition corrected. Eleven standard models are available having maximum torque capacities from 20 to 620 ft-lb. Outside diameters are from 2 to 3⅞ in., mountable on shafts from ½ to 2½-in. diam.

For More Details Circle No. 45—Page 209

Hose and Couplings: Joy Mfg. Co., Oliver Bldg., Pittsburgh, Pa.—Medium-high and high pressure couplings feature a "double-wedge" grip which, the manufacturer claims, makes possible assembly on rubber covered hose without skiving. Should coupling become loose through vibration of flexing, it can be retightened without disassembly by use of a slotted bushing. No special tools or mandrels are required for assembling the couplings on the hose.

For More Details Circle No. 46—Page 209

Mobile Shovel: Industrial Truck Division, Clark Equipment Co., Battle Creek, Mich.—Small, mobile power

shovel has 11 cu ft capacity and is suitable for handling loose packed bulk materials in close quarters. Shovel has outside turning radius of 73 in. Other dimensions: length, 109 in., width, 46½ in., overall height, 60 in., and weight, 4400 lb. Power is from a four-cylinder gas engine, with two speeds in both forward and reverse. Hydraulic brakes are internal expanding double shoe type. Clutch is quick change, automotive type with 10-in. single disk, dry plate.

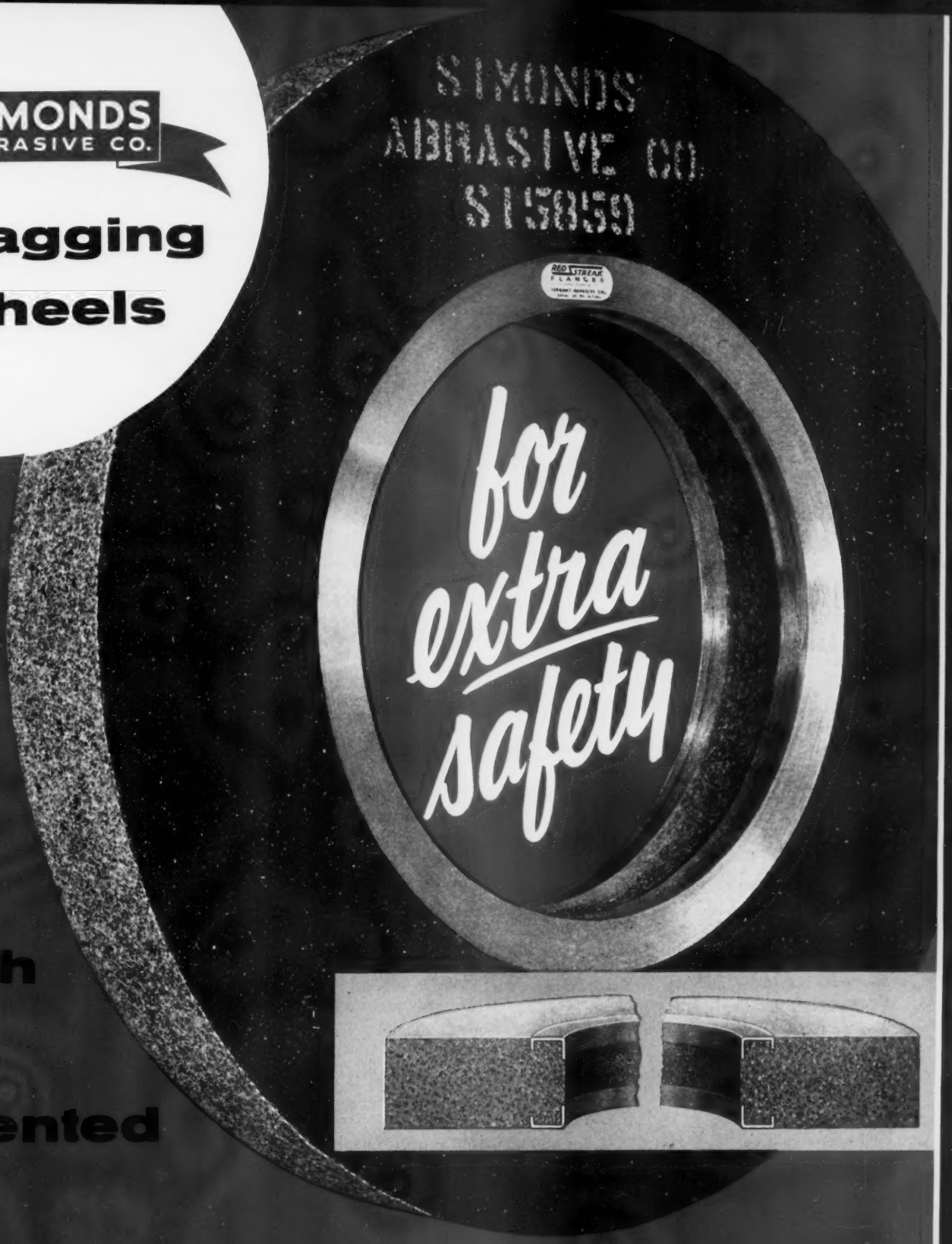
For More Details Circle No. 47—Page 209

Air Regulator: Kendall Controls Corp., 144 Moody St., Waltham, Mass.—Adjustable output regulator for instrument service or air-regulated equipment has a flow capacity up to 15 cfm, maximum inlet pressure of 150 lb and automatic relief if the regulated pressure exceeds preset value. Unit may be panel, bracket or line mounted. Valve spring is stainless steel, diaphragm is nylon and buna N, body is cast aluminum chemically treated for corrosion resistance. Regulator can be furnished with or without pressure gage.

For More Details Circle No. 48—Page 209

SIMONDS ABRASIVE CO.

snagging wheels



with Patented

Reinforcing Flanges...

Rugged, high speed resinoid bonded wheels . . . strong enough to take more than double the force usually encountered in grinding under normal conditions of use. Simonds Reinforcing Flanges prevent radial cracks as wheel wears down to stub. Available in wheels of 6″, 10″ and 12″ hole sizes. Send for bulletin ESA 154 "Simonds Red Streak Flanges" and name of your distributor.

SIMONDS ABRASIVE COMPANY • PHILADELPHIA 37, PA.

Branch Warehouses: Boston, Detroit, Chicago, Portland, San Francisco • Distributors in Principal Cities
Division of Simonds Saw and Steel Co., Fitchburg, Mass. • Other Simonds Companies: Simonds Steel Mills, Lockport, N.Y., Simonds Canada Saw Co., Ltd., Montreal, Quebec and Simonds Canada Abrasive Co., Ltd., Arvida, Quebec

Knight services include:

Foundry Engineering
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Architectural Engineering
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Construction Management
•
Organization
•
Management
•
Industrial Engineering
•
Wage Incentives
•
Cost Control
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Standard Costs
•
Flexible Budgeting
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Production Control
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Modernization
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Mechanization
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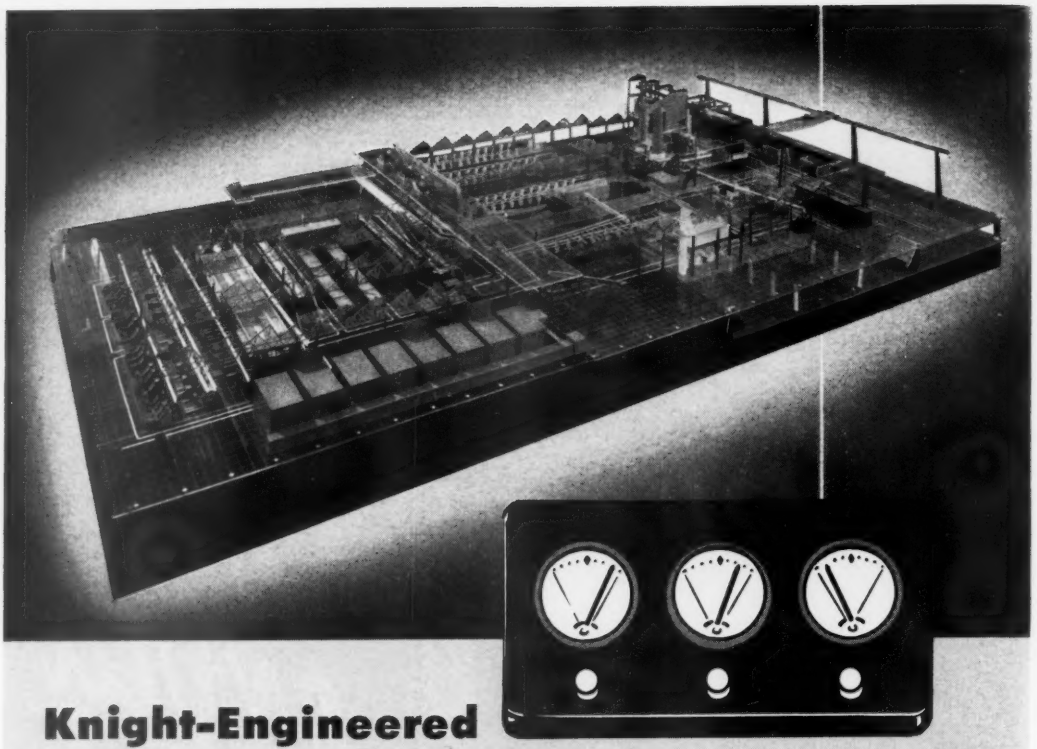
Methods
•
Materials Handling
•
Automation
•
Survey of Facilities



Knight-Engineered
AUTOMATION
increases labor productivity 52% in major foundry

Experienced Knight Engineers, working closely with the client's staff, completed the automation of this foundry unit 18 months ago.

The successful integration of foundry operations into a continuous production sequence, *from raw material to finished product*, increased over-all labor productivity 52%. In one operation alone, 9 men now produce what 53 men formerly produced.

Automation has also accelerated materials handling, established uniform product standards, improved worker morale, increased space productivity 33%, and brought major economies throughout the over-all operation. Necessary changes were scheduled progressively so that automation was accomplished without interrupting production.

The successful operation of this foundry is just one example of Knight's practical experience in the engineering services that increase foundry productivity and decrease unit costs.

Your operation will benefit by the comprehensive experience of Knight Engineers who have completed approximately 400 foundry assignments. A letter will bring a call from a Knight representative at your convenience.

EVIDENCE OF EXPERIENCE

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Springfield, O., high school students tapping the cupola for a run of gray iron. Foundry is operated as part of school's vocational education program

Gary Hitt operates pneumatic jolt squeezer. The school is one of the few in Ohio that operates a foundry

High School Students

LEARN FOUNDRY PRACTICE

By ARCHER MARTIN

FOUNDRY owners in Springfield, O., don't worry about jobs in their shops going begging because of a lack of qualified applicants. The public high school each year graduates trained young men who not only are equipped with the theory of foundry operation but also with actual foundry experience.

In the last 15 years, the high school's department of vocational education has supplied an estimated 55 foundry-course graduates to more than a dozen Springfield shops. In addition, an estimated 35 graduates were supplied to shops outside Springfield and even outside the State.

The school's vocational education department, directed by Herman R. Seaman, is just one of 57 in the state which are administered by the Trade and Industrial Service, Division of Vocational Education, Ohio Department of Education. The foundry at Springfield is one of the very few T. and I. foundries in the State (one of them is at Cleveland).

The function of the vocational educational program is to prepare boys and girls for an occupation and es-

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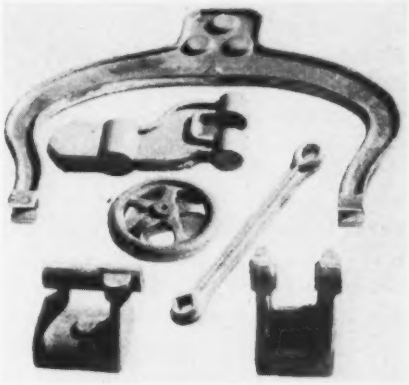


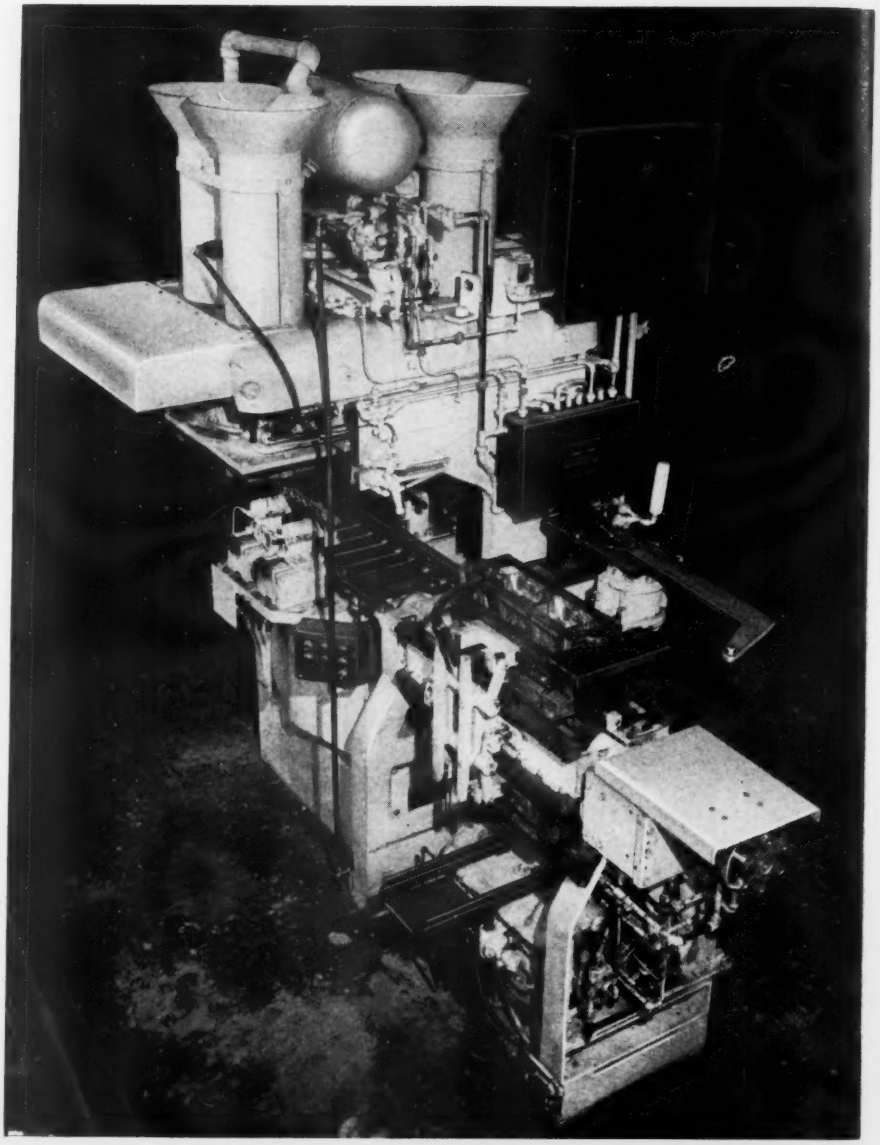
Some of the student-poured castings are a dinner bell yoke and its crank and lathe and drill press components

Foundry Instructor Robert Crabbe tells students Mert West and Martin Burns, right, to lower the ladle and pour the gray iron before it cools

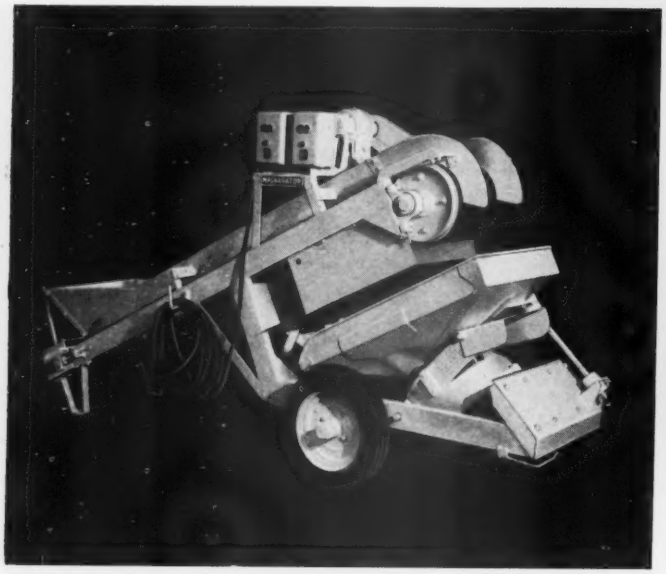
Student demonstrates good form with left hand over handle for leverage. Ladle rests on knee to steady pour

(Advertisement)

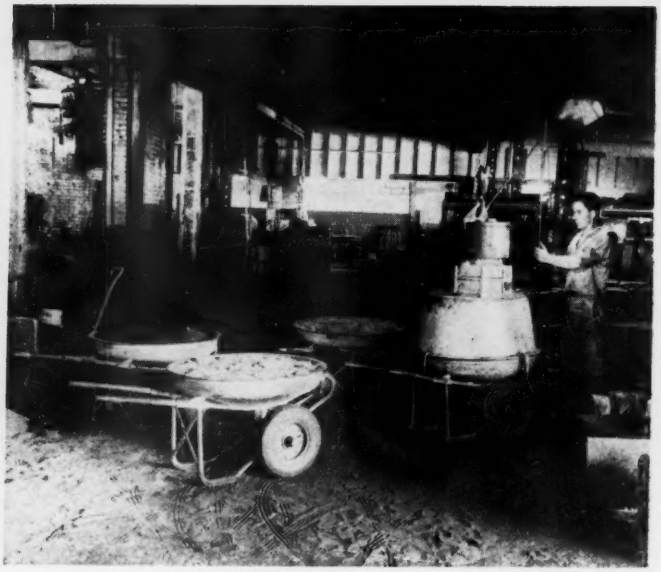
EQUIPMENT IN THE NEWS



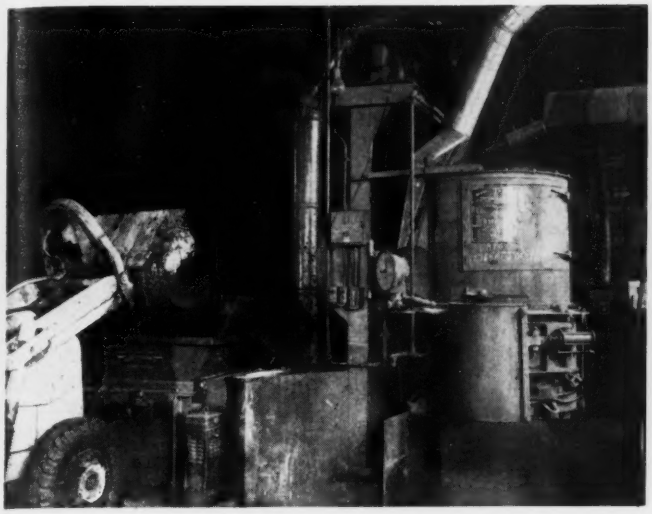
A NEW HIGH SPEED TRUNNION-TYPE ROL-A-COR will speed rollover, draw, and other handling of production and semi-production cores. Used here in conjunction with a Champion CB-18 dual-head Blomatic Core Blower, the TR Rol-A-Cor handles two different boxes blown under two magazines on the blower. The total time cycle for clamping, blowing, unclamping, indexing, rollover, draw, and elevation of core to handling height is only 15 seconds. *For full data write to Beardsley & Piper, 2424 N. Cicero Ave., Chicago 39, Ill.*



MORE EFFECTIVE SAND CONDITIONING for the small foundry is now available at a cost well within even the most moderate budget. Reports on the new low priced Magnarator, which offers convenient hopper loading, magnetic separation, thorough screening and full aeration, indicate that up to 20 tons an hour can be handled by this portable machine. *Beardsley & Piper, 2424 N. Cicero Ave., Chicago 39, Ill., will provide full details.*



REALLY PORTABLE MULLING EQUIPMENT offers the foundry core room maximum flexibility at great savings. The Krause Foundry Co. uses their Mulbaro with four mulling barrows. The sand is loaded only once—when it is put into the barrows—and is mulled, delivered, and used from the same barrows. The mulling mechanism is utilized more fully *with no time lost for sand handling. Get all the facts from Beardsley & Piper, 2424 N. Cicero Ave., Chicago 39, Ill.*



SMALL FOUNDRIES TOO can get all of the advantages of fully mulled and conditioned molding sand. This small, extremely compact Speedmullor-Preparator Unit is ideal for the small shop that needs complete sand preparation and resultant quality control. Six different low-cost units with capacities of from 7 to 70 tons per hour are available. *Send for all of the facts: Beardsley & Piper, 2424 N. Cicero Ave., Chicago 39, Ill.*

JOBBING FOUNDRIES HAVE A PROBLEM in handling a variety of short-run patterns. At Beloit Foundry much of this work is effectively handled on a J&J Jolt Rol-A-Draw. Pattern change time is minimized and machine handling of medium and medium-large flasks greatly reduces the load on cranes. The new J&J Rol-A-Draws feature *automatic air clamping of pattern boards. Beardsley & Piper, 2424 N. Cicero Ave., Chicago 39, Ill., will provide full data.*

80% OF BELOIT FOUNDRY'S DOUBLED TONNAGE is rammed by this Motive Speedslinger in a bay only 30 feet wide. Before its installation the foundry produced a little over 30 tons daily. After the Speedslinger was placed in operation this daily tonnage was boosted to 60. Not only that, but the foundry gets better results and can handle a wider range of large patterns. The slinger gives the foundry better control and uniformity too. *Write now for full information: Beardsley & Piper, 2424 N. Cicero Ave., Chicago 39, Ill.*

(*Concluded from page* 225)

pecially to take care of those students who don't expect to enter college. The state suprvisor for trade and industrial education is Robert M. Reece of Columbus.

Springfield's vocational education department offers five major areas of study. They are machine drafting, wood patternmaking, foundry, machine shop and sheet metal working. Of these, none is more important than the study of foundry practices.

The school's foundry — better equipped than some production foundries—is located in a building of its own at the rear of the main school building. It has a cupola room and a molding room downstairs. Upstairs are storage bins, an office, showers and lockers. Accessory equipment includes a crane, two molding machines, a pneumatic jolt squeezer, a sand blaster, a power riddle, a core oven, two air grinders, an air rammer, two air chisels and a large assortment of flasks.

The foundry has a No. 0 Whiting cupola, lined down to 18 inches. The class usually charges it with 1 pound of coke to 6 pounds of iron, which will melt three-quarter of a ton an hour. A gas-fired furnace has a capacity of 30 pounds of aluminum and 150 pounds of bronze.

The foundry is operated under the direction of Instructor Robert Crabbe, himself a product of the course he now teaches. He has nine years of experience in the industry. He has his students pour aluminum almost every school day, gray iron each month or so and brass and bronze one or two times a school year.

Many of the pieces cast by the students are designed, drafted, patterned and machined by other students in the department. The castings —unless poured merely for "classroom exercise"—are put to use in the school's shops or are sold to the students. A wood lathe is an example. All of its castings were made in the school foundry.

Generally speaking, Springfielders are proud of the trade and industrial education that their high school offers to their youngsters. One of the city's newspapers twice has published full-page picture stories about the vocational department — the latest describing the foundry.

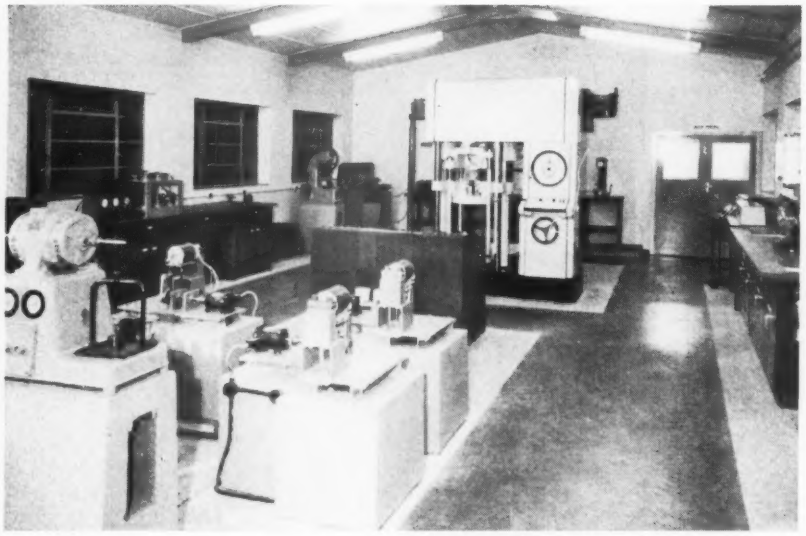
What do foundry men think about this program? Here is what Don B. Applegate, president of the K. & A. Aluminum Foundry, Inc., says:

"I think the type of training the boys are getting out there is very good. Of course, I know and I think they know—that they're not going to learn everything about the business by the time they are out of school. However, they are getting valuable preliminary training in the industry, and those who discover after all that they don't want to make foundry work their career discover it in time. On the whole, we have been well pleased."

Lawrence J. Schutte, superintendent at the National Supply Co.'s Engin Division here, declared, "We hav quite a few men in the Nationa Supply foundry who have come ou of the program at the high schoo We are very much in favor of thi program. We have found that thes fellows have been provided with th basic knowldge they must use i foundry practices. I believe thei training at Springfield High Schoo has been perfect for this type o work."

It was the National Supply Co which provided the cupola used in the school foundry, Mr. Schutte pointed out.

Some of the Springfield foundries which have benefited from the program—either through the work of co-op students or that of graduates —are: The National Supply and K. & A. foundries, Ohio Steel Foundry Co., J. & J. Foundry Inc., Oliver Corp., Western Foundry & Mfg. Co., O. S. Kelly Co., Bauer Bros. Co., Robbins & Myers Inc., James Leffel & Co., Nolte Brass Foundry Co., Springfield Aluminum Plate & Casting Co., and the Springfield Machine Tool Co.



TENSILE TESTING: A new engineering laboratory was opened on Nov. 2 at Fulmer Research Institute, near London, England. Equipped for tensile testing at low, normal and high temperatures, it houses a 50-ton tensile testing machine, apparatus for fatigue and hardness testing at high and low temperatures, an impact machine and other equipment. The institute has five divisions, one of them devoted to the foundry field

Offers Safety Leaflets

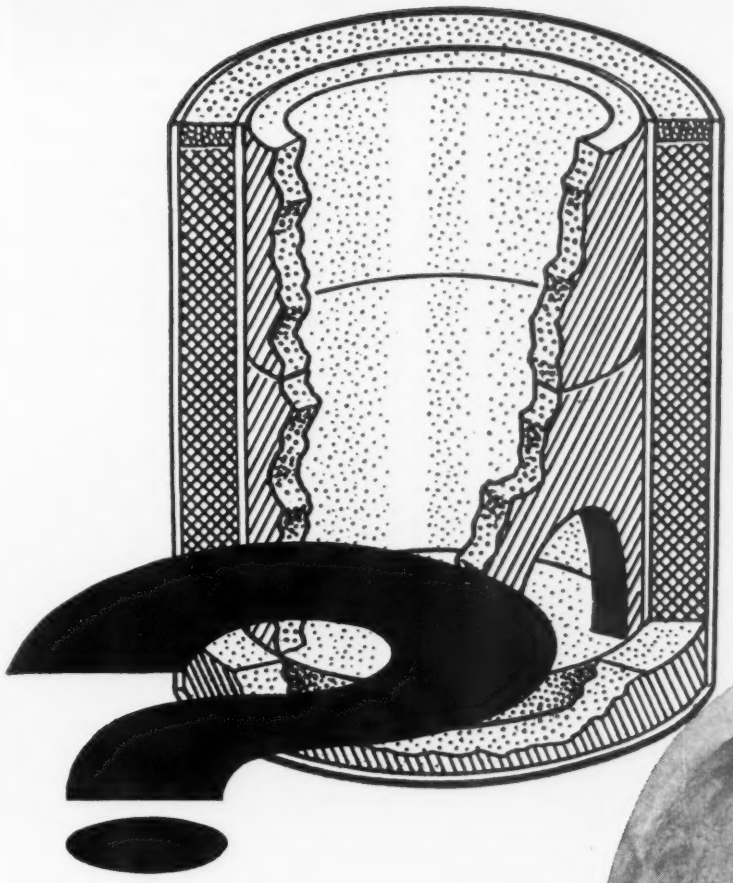
New employee training leaflets, published by the National Safety Council, are packed with illustrations and sound tips on how to stay safe on the job. The leaflet. "Accident Preventers," uses cartoons to teach safe principles and practices on lifting, housekeeping, clothing and hand tools. For sample copies and quantity prices write the National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.

Book Review

Hugh Roy Cullen: A Story of American Opportunity, by Ed Kilman and Theon Wright, cloth, 6 x 9 in., 376 pages, published by Prentice-Hall Inc., 70 Fifth Ave., New York 11, N. Y. Price $4.

This is a biography of one of the most unusual men of our time, who rose, by means of hard work, faith and courage, to become "king of the Texas wildcatters," one of the country's wealthiest men, and one of the greatest philanthropists of all time. To the Cullen Foundation, which distributes funds for philanthropic purposes, he has given oil properties worth $160 million.

The book sounds a note of optimism as it substantiates the fact that opportunity in America is still alive, that the individual is important, and that faith is a vital ingredient in successful living.



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Properties of Gray Iron

(*Continued from page 97*)

in an austenitic structure. Chromium additions in the range of 16 to 33 per cent completely eliminated growth.

White and Elsea[15] showed that high silicon content (approximately 6.0 per cent) effectively prevents growth below 1775° F. This behavior is attributed to the fact that irons of this type are ferritic and that the silicon raises the critical temperature to 1775° F. Therefore no growth as a result of graphitization or differential expansion and contraction at the critical temperature can occur below 1775° F. High silicon also has been reported to minimize oxidation up to 1750° F. This action probably also contributes to its ability to inhibit growth. The usefulness of high silicon cast irons is limited by the fact that they are very brittle up to 400° F. Dastur and Cohen[7] showed that growth decreases with increasing phosphorus content.

Annealing of unalloyed gray cast iron at 1600° F was found[16] to increase growth in subsequent tests in steam atmospheres at 750° F. A ferritic matrix was produced by the anneal. The resulting increased growth is opposite to the results obtained[15] on ferritic irons with high silicon contents. This difference in growth probably is brought about by differences in alloying and in test conditions. The ferritic iron tested in a steam atmosphere probably was subject to severe oxidation and also possibly to hydrogen gas absorption. These phenomena, most likely, caused its growth. The high silicon iron was tested in air, and under this condition it was not subject to appreciable oxidation[6] or to hydrogen gas absorption.

Considerable work[8,9,17] has been done on the effects of small chromium additions on cast iron growth. Chromium contents as low as 0.3 per cent prevent growth up to 1000° F in some irons, but several times that amount is required for temperatures of 1600° F.

Growth Inhibitors

Blott[17] determined the effects of small amounts (in the range from 0.12 to 1.70 per cent) of many common alloying elements on the growth characteristics of cast iron. He found that copper is a weak growth inhibitor; boron is somewhat better; vanadium still better, and chromium is the best growth inhibitor. Nickel and molybdenum, according to Blott's results, are growth promoters. Combinations of nickel and chromium and molybdenum and chromium, are, however, growth inhibitors. All of Blott's irons showed some growth starting at about 1000° F, an appreciable decrease at the eutectoid temperature, and a pronounced increase in growth rate at 1600° F. Those irons which grew the most also lost the most strength and hardness at elevated temperatures.

Grant's short-time elevated temperature tensile tests on unalloyed irons[11,12] showed little change in properties up to 800° F and a rapid deterioration of properties above that temperature. These tests showed increased elongation in cast iron at elevated temperatures. Bolton[13] reported that all cast iron alloys maintain almost constant tensile strength up to 800° F, but exhibit a rapid decrease in strength at higher temperatures. He also stated that elevated temperature tensile properties of various cast irons are in the same relative order as the room temperature properties. In other words, alloying elements, such as chromium, molybdenum, and nickel, which improve room temperature properties are also beneficial at elevated temperatures.

Tensile and fatigue properties of a low alloy iron and an austenitic iron

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were determined at temperatures up to 1200° F by Collins and Smith[18] and Collins[19]. The low alloy iron contained 0.37 per cent copper, 0.31 per cent chromium and 0.20 per cent nickel. The austenitic iron contained 14.90 per cent nickel, 2.09 per cent chromium and 6.94 per cent copper. No significant decrease in tensile and fatigue strength of the low alloy iron was found up to 800° F, but at higher temperatures both properties decreased sharply. Tensile strength of the austenitic iron decreased gradually but continuously from room temperature to 1200° F, whereas fatigue strength was almost constant. At 1100° F the austenitic iron had lost only 45 per cent of room temperature tensile strength, but the low alloy iron had lost 60 per cent. Neither iron was appreciably notch sensitive in fatigue or tension.

MacPherran and Krueger[14] studied the effects of heating for 500 hours between 800 and 1100° F on the room temperature properties of six pearlitic cast iron alloys. No effect on properties was found upon heating them up to and including 800° F. Softening, weakening, and decomposition of pearlite started between 800 and 850° F and increased gradually as the holding temperature increased. The deterioration of properties and structure was decidedly retarded by chromium additions in the range from 0.32 to 0.54 per cent. Holding for 500 hours at 1050° F caused the complete decomposition of carbide in all irons except those containing chromium. Decomposition of pearlite was greatly speeded by silicon additions and moderately accelerated by nickel. Some of the irons showed a continued loss in strength and hardness after complete pearlite decomposition.

Carried out Creep Tests

Some of the earliest creep tests on cast iron were carried out by Lorig and Dahle[20]. They compared creep at 700° F in two unalloyed irons with that in two irons containing 0.83 per cent molybdenum. Tensile strengths in the unalloyed irons were 45,000 and 32,900 psi; in the molybdenum irons, they were 59,500 and 52,500 psi. The molybdenum irons were considerably more resistant to creep than the unalloyed irons, and the higher strength, unalloyed iron was somewhat better than the lower strength iron. The creep rate at a testing time of 1000 hours and a stress of 10,500 psi was 3.4 x 10^{-5} per cent per hour in both of the unalloyed irons. At similar testing times and at stresses from 10,500 to 24,000 psi, the creep rate in the molybdenum cast iron was zero. Lorig and Dahle stated that the resistance of molybdenum cast iron to creep is comparable to that of some

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steels they had observed.

The above information on creep properties was supplemented by Allen[23] who gave the results of a test on nickel alloy cast iron which was, apparently, run in conjunction with the tests reported by Lorig and Dahle. A nickel addition of 1.50 per cent improved creep resistance slightly over that of the unalloyed irons at 700° F and a load of 10,500 psi. Nickel, however, was not as effective as molybdenum in retarding creep.

Grant[11] conducted creep tests on an unalloyed, pearlitic cast iron at loads ranging from zero up to 8,000 psi at 932° F. Carbon equivalent of the alloy tested was 3.71, and room temperature tensile strength was 37,600 psi. Creep tests were carried out in air for from 840 to 1440 hours—the tests at lower loads lasting for longer periods of time. Creep rates at the end of the testing periods ranged from 2.1 x 10^{-5} per cent per hr for the 8000-psi load down to 0.32 x 10^{-5} per cent per hr for a 2000-psi load. These creep rates include elongation due to mechanical loading and to growth. The growth rate (no load) was 0.18 x 10^{-5} per cent per hr, which is equivalent to slightly more than one-half the creep rate at a load of 2000 psi. Grant observed that the pearlite became spheroidized during the tests and that a small surface layer of the metal had become oxidized. The creep rates reported by Grant[11] are of the same order of magnitude as those determined by Lorig and Dahle[20].

Conducted Growth Tests

Growth and creep tests were conducted in the range from 700 to 1000° F by Tapsell, Becker and Conway[24]. The authors concluded that unalloyed irons and those with small chromium and nickel additions retain useful properties up to 1000° F, but that in the as-cast condition, growth is too great for practical use at that temperature. Their conclusion that growth is excessive at 1000° F in irons containing small chromium additions is not in accordance with other published information[6, 8, 9, 17].

Tapsell, Becker and Conway[24] also found that an austenitic iron containing 17.72 per cent nickel, 5.84 per cent silicon, and 2.10 per cent chromium was unstable at testing temperatures of 842 and 1000° F. Growth and creep were excessive, and the iron was not suitable for use at those temperatures. Another austenitic iron, containing 16.56 per cent nickel, 7.30 per cent copper, 3.30 per cent chromium and 1.11 per cent silicon, was tested and showed very good growth and creep resistance up to 1000° F. These results indicate that silicon additions are detrimental to the creep and growth resistance of austenitic irons. The same authors stated that high silicon, ferritic irons have good resistance to growth and creep because of their ferritic matrices. They found that growth in pearlitic irons could be minimized by a graphitizing pre-anneal at 1200° F.

"Yeah? Well, I've been slaving all day, too—over a hot bull ladle!"

L. W. Bolton[25] determined the resistance of various irons to bending creep when loaded as a cantilever beam. Maximum stress was 4000 psi and the testing temperature was 1580° F. Silicon decreased creep rate considerably when added in steps from 1.98 to 13.77 per cent. (Silicon raised the transformation temperature; therefore, the stable structure at the testing temperature was probably austenite with the lower silicon contents and ferrite in the irons with appreciable silicon additions.) Phosphorus, when increased from 0.38 to 1.10 per cent, improved creep properties. Austenitic chromium-nickel irons resisted creep well. They were similar in this respect to high silicon irons.

The most recent study of creep in cast iron was carried out by Tottle[26]. Five irons, including one unalloyed iron and four low alloy irons, were tested at temperatures of 750 and 930° F and at stresses from 5000 to 20,000 psi. The low alloy irons contained the following additions: (a) 0.51 per cent molybdenum; (b) 1.51 per cent copper and 0.41 per cent molybdenum; (c) 1.36 per cent copper and 0.82 per cent chromium; (d) 4.08 per cent silicon, 1.26 per cent chromium, and 0.90 per cent molybdenum. Carbon equivalent in all irons was 3.3 except in iron (d), in which it was 4.2. Creep rates were determined for each material at various stresses after 1000 hours of testing at 750° F. Results indicated that molybdenum iron (a) was the most resistant to creep. The molybdenum-chromium-silicon iron (d) was slightly less resistant. Approximately equal creep rates were obtained for the unalloyed iron and the alloy containing copper and chromium (c). Iron (b) containing copper and molybdenum was the least resistant to creep. Creep rates after 2000 hours of testing ranged from 0.02 x 10^{-5} to 2.4 x 10^{-5} per cent per hr, depending upon the stress and alloy. No growth or changes in microstructure were found in any of the alloys when they were exposed for 2500 hours to temperatures up to 930° F. No explanation for the absence of growth and microstructural changes is given in the article.

Tottle[26] also conducted a few stress-rupture tests on the same irons. As in the creep tests, the molybdenum iron (a) showed the best properties. The order of relative merit of the other alloys, however, differed from that established for the creep tests. The copper-chromium iron (c) was the next most resistant to rupture. This was followed in order by the ordinary iron, copper-molybdenum iron (b), and the silicon chromium-molybdenum iron (d). The number of stress-rupture tests was not, however, sufficient for positive conclusions.

Thermal Shock Data Lacking

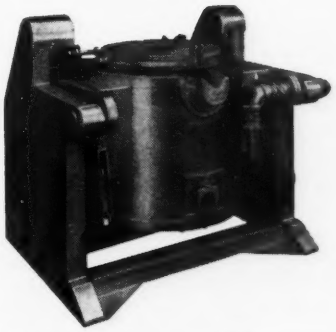
Burgess and Barlow[16] conducted a literature survey in 1945 and reported that no data on the thermal shock resistance of cast iron was available. Since that time, Hallet[6] has conducted four types of thermal shock tests on various cast irons. The test specimens were small, square, open-top cast iron boxes. His tests consisted of the following heating and cooling cycles:

1. Quench in cold water from 1290° F.
2. Heat rapidly in furnace to 1830° F and cool on cold iron plate.
3. Molten iron at 2370° F poured into box, held 5 seconds, emptied, and air cooled.
4. Heat to 1800° F in 1.5 hour, hold 1.5 hour, and cool to room temperature in 10 hours.

Each specimen was heated and cooled repeatedly through one of the above cycles until a crack appeared. The number of cycles without cracking was an indication of the relative thermal shock resistance of the iron. The severity of the test decreased in order from the first through the fourth test above. Small additions of chromium and nickel improved the thermal shock resistance of cast iron appreciably. Austenitic irons with nickel content in the range 14 to 23

(*Continued on page* 234)

Lindberg-Fisher Electric Resistance Melting and Holding Furnace equipped with heavy duty resistance elements which give uniform distribution of heat, insuring long element and pot life. Capacities 250 to #1000 crucible.



Lindberg-Fisher type MNP nose-pour tilting crucible furnace. Pouring lip is located in the axis of tilting providing a constant pouring arc regardless of degree of furnace tilt. Capacities up to #800 crucible with brass, up to #1000 crucible with aluminum. Oil or gas fired. Described in Bulletin 57-A.

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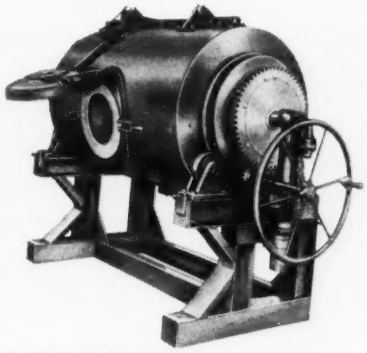

Lindberg-Fisher Simplex Rotary Open-Flame Furnace. Capacities to 2400 lbs. aluminum. 6000 lbs. brass. Oil or gas fired. Described in Bulletin 29-A.

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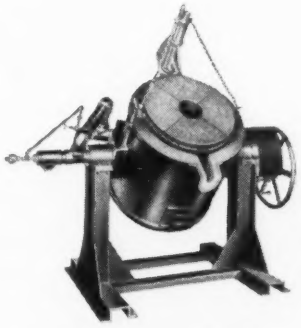
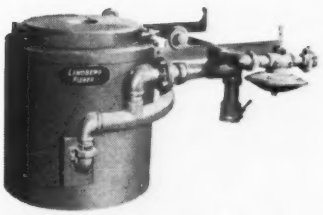


Lindberg-Fisher type BB1 Hand-Tilt Crucible Furnace. Tilting mechanism consists of a hand wheel, driven through machined worm gear and pinion reducing gears. Capacities 50 to #400 crucible. Oil or gas fired. Described in Bulletin 400.



Lindberg-Fisher type SF stationary crucible furnace features rapid melting and is recommended for general foundry casting work. Capacities 30 to #400 crucible. Oil or gas fired. Described in Bulletin 301.

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(*Continued from page* 232)

per cent were very resistant to thermal shock. The maximum resistance was obtained in high chromium irons (16 to 33 per cent chromium).

Little mention is made in the literature of the effect of graphite flake structure on the elevated temperature properties of cast iron. A few investigators mention that a fine, uniformly distributed flake structure is desirable, but little experimental evidence to prove this claim is available.

The elevated temperature properties of steel have been studied more exhaustively than those of cast iron[27]. The strong carbide-forming elements —molybdenum, vanadium, tungsten, titanium and columbium—improve the creep resistance of steel. Small chromium additions do not improve creep strength, but are used to prevent excessive oxidation. Manganese, nickel, copper and silicon in small amounts are not helpful to the creep properties of steel. Nickel, when present in sufficient quantity to make steels austenitic, is very beneficial. Large chromium additions usually are used along with the nickel to obtain optimum elevated temperature properties. Insofar as the available data permits a comparison, factors which improve creep properties of steel do the same for those of cast iron. For example, molybdenum is effective in decreasing creep in both materials, and copper and small nickel additions are not very helpful. Nickel additions sufficient to produce austenitic structures are beneficial to the creep resistance of both steel and cast iron. It is likely, therefore, that other alloying elements, such as tungsten and vanadium, which improve creep resistance in steel would also be beneficial to cast iron.

Conclusions to Literature Survey—The information gained in the literature survey shows only a partial correlation between creep properties and other high temperature properties. For example, small chromium additions appreciably increase resistance to growth, thermal shock and deterioration of tensile properties at high temperatures[6, 8, 9, 17], whereas malybdenum is not very effective in these respects[17]. Molybdenum is, however, much more effective in improving creep resistance than chromium[20, 26], and is, apparently, the most effective alloying element for improving stress-rupture properties. Austenitic irons with nickel contents in the range from 14 to 25 per cent are reported to perform well in all elevated temperature tests[6, 19, 24, 25]. This result is to be expected since austenitic structures are known to enhance the heat resistance of steels. An exception is the high silicon austenitic irons, which show poor creep resistance. High silicon ferritic irons, however, are resistant to both growth and creep[15, 24, 25]. A 1200° F graphitizing pre-anneal shows promise of producing the same effect as high silicon content[24]. Alloying copper with cast iron seems to have no beneficial effect on any elevated temperature properties[17, 26]. Small nickel additions are not very beneficial[14, 17, 23]. High chromium content (16-33 per cent) in cast iron has been reported to improve shock and growth resistance[6] greatly. Chromium additions of this magnitude are probably not practical, however, because of their embrittling effects.

The information gained in the literature survey indicates that alloy additions of chromium, molybdenum and nickel (14 per cent or more) show the most promise for producing good creep, stress-rupture and thermal shock properties in cast iron. Since vanadium, titanium, and tungsten are beneficial to the creep properties of steel they probably merit some investigations in cast iron. A graphitizing pre-anneal is a possible technique for improving heat resistance.

These conclusions are based on very limited information. Many more experimental data are required in order to draw definite conclusions concerning the merits of various cast iron alloys for high temperature service. The present investigation therefore will not be limited entirely to alloys which have shown promise in previous elevated temperature testing.

Alloys in Screening Tests—Twelve alloys were furnished by various foundries for screening tests. The analyses and properties reported by the manufacturers are shown in Tables I and II. Also shown in Table I are results of spectrographic analyses. A fair spread of cast iron alloys was obtained, including four unalloyed (Nos. 3, 4, 6 and 12), six low alloy (nos. 1, 2, 5, 7, 10 and 11), and two nodular (Nos. 8 and 9) irons. Included in the low alloy irons are a molybdenum iron (No. 1), a chromium iron (No. 7), a nickel-molybdenum iron (No. 5), a chrome-nickel iron (No. 2) and two chrome-nickel-molybdenum-vanadium irons (Nos. 10 and 11).

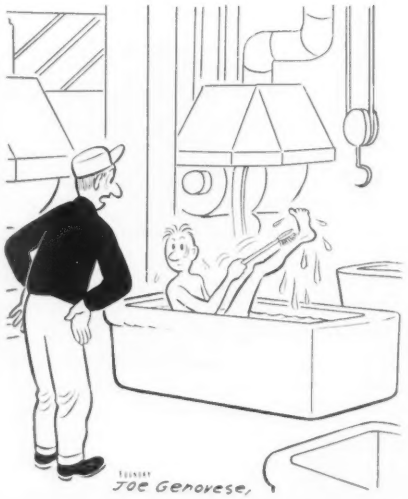
Some of the samples were similar in composition. For example, the unalloyed irons are almost identical. The two nodular irons have exactly the same compositions but differ in structure, No. 8 being ferritic and No. 9 pearlitic. The chrome-nickel-molybdenum-vanadium alloy irons are almost the same. Seven distinctly different compositions therefore were available for the screening tests.

Experimental Results—The screening tests consisted of hardness determinations on each sample of cast iron after various holding times at 1100 and 1200° F. All samples were stress relieved for 2 hours at 950° F before the screening tests, in accordance with ASTM Specification A278. Test specimens several inches long were used for the screening tests. Test wafers, ⅜ in. thick, were cut from these samples after various holding times at test temperature. Brinell hardness readings were taken on the inside surface of each wafer. This precaution eliminated the possibility of surface oxidation influencing the hardness readings.

These tests showed the ability of the various alloys to resist softening due to heat and were intended to indicate which alloys are most heat resistant and therefore most likely to have the best creep and stress-rupture properties.

Results of these tests are shown in Figs. 1 and 2. All the irons were not run at both 1100 and 1200° F, but sufficient tests were performed to indicate the relative resistance to softening of each alloy. The four unalloyed irons (Nos. 3, 4, 6 and 12) were the least resistant to softening. Iron No. 1, which is a molybdenum iron, was only slightly better. Because the ferritic nodular iron (No. 8) was relatively soft when received, its hardness decreased very little at 1100° F. Its final hardness was slightly higher than that of the molybdenum iron (No. 1). Irons 2, 5, and 9 can be classified as having intermediate resistance to softening. Alloys 7, 10, and 11 softened the least. The relatively low as-received hardness of Alloy No. 7 was the result of the manufacturer's heat treatment, con-

(*Concluded on page* 237)



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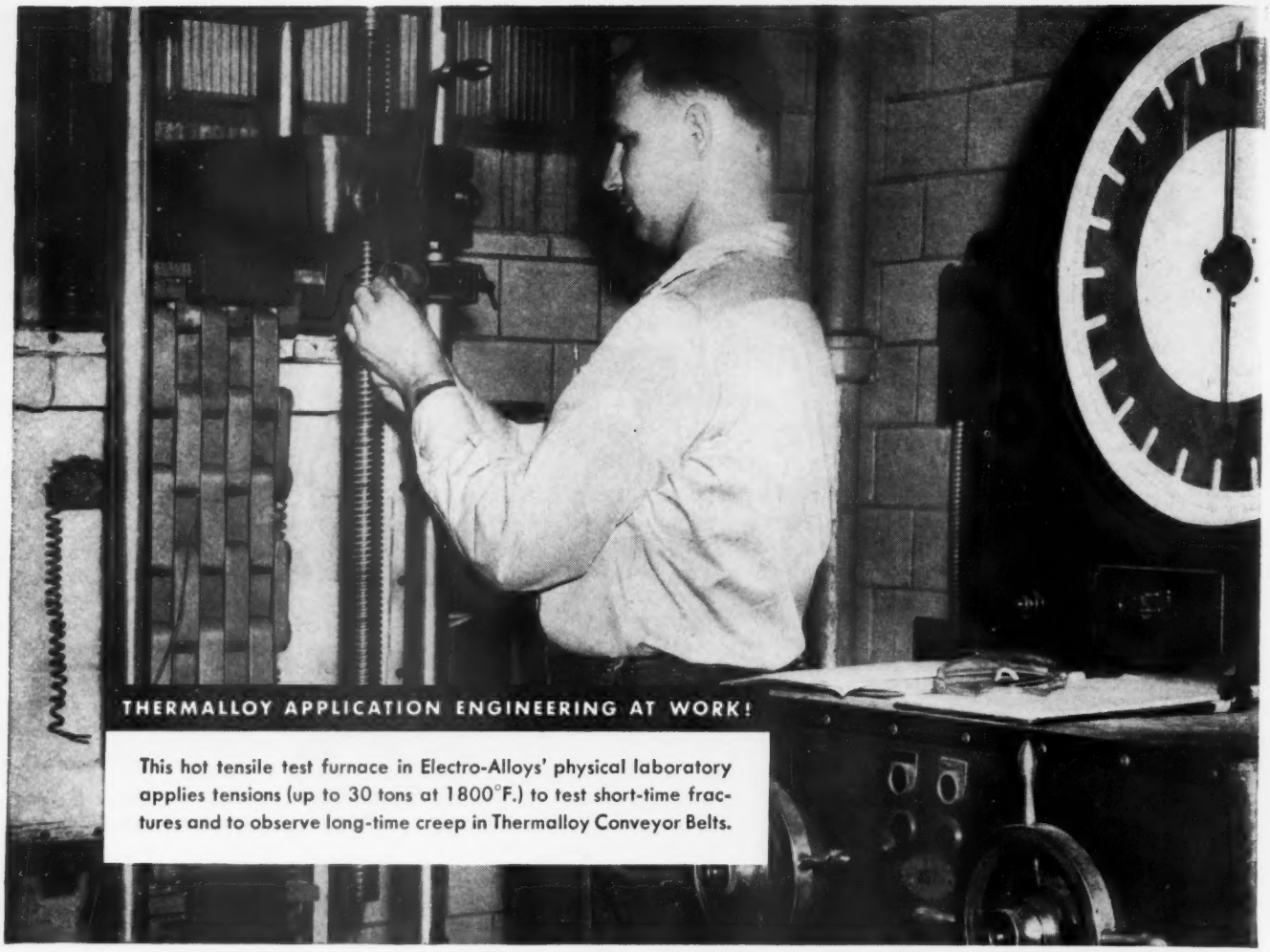
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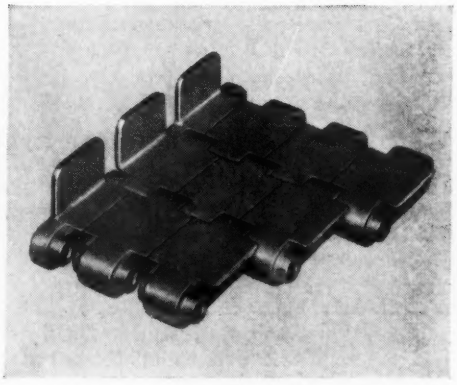

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(*Concluded from page 234*)

sisting of 4 hours at 1650° F followed by furnace cooling.

In summary, the relative resistance to softening of the various alloys is shown in the following list, starting with its poorest and proceeding in order through the best:

1. Alloys 3, 4, 6, and 12, unalloyed irons
2. Alloy 1, molybdenum iron
3. Alloy 8, ferritic nodular iron (unalloyed)
4. Alloy 9, pearlitic nodular iron (unalloyed)
5. Alloy 5, nickel-molybdenum iron
6. Alloy 2, chrome-nickel iron
7. Alloy 7, chromium iron
8. Alloys 10 and 11, chrome-nickel-moly-vanadium iron

All of the alloys have been examined metallographically in the as-received condition. Results of these studies are shown in Table III. The partially martensite structure of alloy 5 probably is the main reason for its higher hardness than that of unalloyed irons both in the as-cast and annealed conditions. Heat treatments performed by the manufacturers resulted in partially ferritic and ferritic matrices respectively in irons 7 and 8. Graphite flake size and distribution seem to have little effect on softening.

Conclusions—The screening tests show good correlation between resistance to softening at elevated temperatures and alloy content of the various cast iron alloys. Unalloyed irons showed the poorest resistance to softening, and the most highly alloyed irons (chrome-nickel-moly-vanadium) were the most resistant. Chromium is the most effective single alloying element for preventing softening. Molybdenum has very little effect, but an addition of nickel and molybdenum is slightly better. Unalloyed nodular iron resists softening to a slightly greater degree than unalloyed gray iron.

Irons with ferritic matrices are, of course, softer than those with pearlitic matrices in the as-cast or heat treated conditions. During annealing at 1100 or 1200° F for extended periods of time, however, the ferritic irons do not lose as much hardness as those with pearlitic matrices. The final hardness is, apparently, more dependent upon alloy content than upon the amount of ferrite and pearlite in the original structure. The presence of martensite in the starting structure seems to contribute somewhat to the retention of hardness after annealing at 1100 and 1200° F. In general, the type of alloy additions has a greater effect upon final hardness than graphite or matrix structure.

The literature survey indicated that resistance to creep and stress-rupture can not be predicted confidently on the basis of other elevated temperature tests. It would not be wise, therefore, to assume that irons with the most resistance to softening have the best creep and stress-rupture properties. Molybdenum cast irons, for example, did not resist softening nearly as well as those containing chromium. Previous creep testing[20,26], however, indicates that the molybdenum irons are superior in creep and stress-rupture properties.

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Future Work—In view of the questionable correlation between creep and stress-rupture and other elevated temperature properties of cast iron, the selection of alloys for stress-rupture and creep testing was based not only upon the results of the screening tests, but also upon the information gained in the literature survey and a desire to include a wide range of alloys in the tests. The following selection of cast iron compositions for stress-rupture and creep testing was made: Unalloyed cast iron, molybdenum alloyed cast iron, chrome-moly alloyed cast iron (heat treated), nickel-moly alloyed cast iron, automotive cast iron, chromium alloyed cast iron (heat treated), nickel-chrome-moly-vanadium alloyed cast iron and nodular cast iron (annealed). The program upon these materials is in progress.

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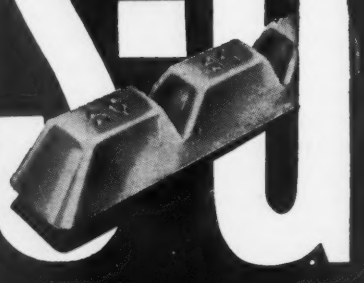

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Simplifying Work

(*Continued from page* 81)

ductive manufacturing cost for the part may be obtained by totaling the cost of the individual operations.

Carrying the burden account as a percentage of productive labor, a common practice in many industrial plants, indicates than any decrease in Standard Hours through work simplification will show a corresponding decrease in the cost of manufacture for that part. This method provides the industrial engineer with a very useful tool when he analyzes and reduces costs. He is able to see clearly the reduction in cost on a piece-part basis resulting from his analysis.

No mention has been made of the standardization of working conditions or equipment, but these are a necessary part of any standards program. A worker must have proper lighting, ventilation and tools to perform his work effectively. Clean, orderly arrangement of work areas, Fig. 4, improves worker effectiveness and quality of production.

To summarize briefly, the benefits to be gained from a program of standardization are as follows:

1. More efficient operations through the establishment of standard motion paths.
2. More effective use of labor through better distribution of manpower.
3. Accurate efficiencies for the use of management in the evaluation of department and plant performance.
4. More accurate part costs for developing sales prices and evaluating cost on a piece-part basis.

The establishment of standard measures of performance on each individual part as it is routed through the plant not only will save costs in itself, but will provide a basis for further improvement through methods analysis.

Methods Analysis—Now let us look at the second general area in a program aimed at reducing costs. This is the area of methods analysis.

The basic need in any approach aimed at methods improvement is the need for a questioning attitude. Typical questions that the industrial engineer, the foreman or even the worker himself should ask might include these:

1. Is the operation necessary?
2. Is the operator busy?
3. Is the operator using ineffective movements or performing what might be unnecessary work?
4. Are the materials in the right place?
5. Is the work area at the right height?

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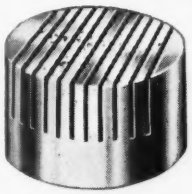
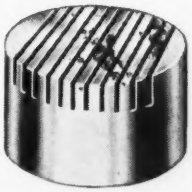
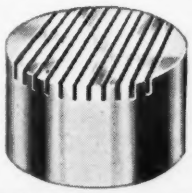


X-TRA DEEP HEAD .156 Wide Slots .014

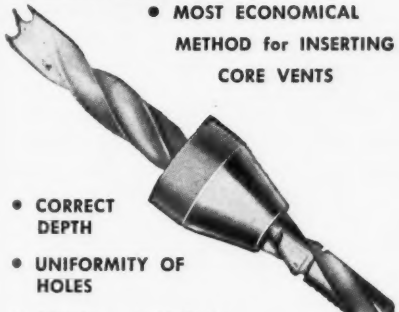


DEEP HEAD .093 Wide or Narrow Slots .014 .010



SHALLOW HEAD .031 Wire or Narrow Slots .014 .010

INSERTING DRILL



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These are just a few examples of the questions that we should be asking about our operations. Many times the answers to such questions are not readily obtainable. They will, however, stimulate thinking that may result in job improvement. The methods engineer is trained to work out scientifically the answers to these questions, but that does not relieve supervision of the responsibility for taking an active interest and making suggestions as to possible improvement areas. In many plants, as in ours, a suggestion program for the hourly workers is very helpful in pointing out areas for improvement.

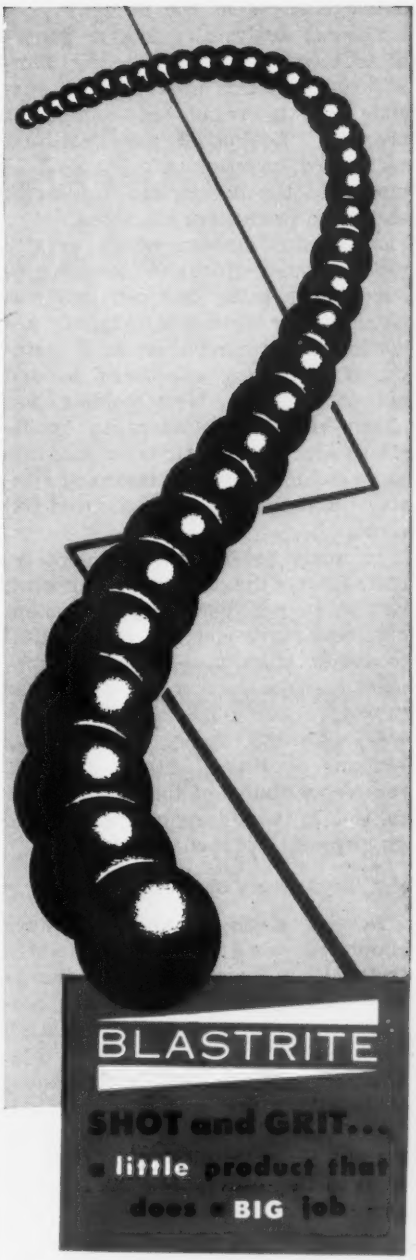
The analysis of product design is a very important part of any methods improvement program. Such analysis seems the logical place to start since there will be no need to analyze a process or motion path if it is possible to eliminate either through a change in product design. Many times in foundry work it is possible through close contact and co-operation with our customers to eliminate or combine cores so that reduced casting cost is possible. A recent example is the four-piece core, Fig. 6, used in the manufacture of a motor end frame. We have worked closely with the customer on a slight change in casting design which will make possible the use of a one-piece core, Fig. 7. Use of this core will save a large percentage of the labor hours now spent in making, cleaning and assembling these cores.

Changes Eliminate Operations

Changes in gating often reduce or eliminate grinding operations in the finishing department. It often is possible to use a snap-off gate in an area on the casting that is not too critical, thereby eliminating the need for grinding. A wheel cylinder commonly used in automotive braking systems is an example of simplifying an operation through the relocation of a small snap-off gate.

The gate was originally a small half-moon on the parting line through the center of a boss. One operation in the machining of this casting called for center drilling this boss. To eliminate the possibility of side thrust on the drill, it was necessary to grind the boss. After an analysis of the situation and work with the customer, it was decided that moving the gate slightly away from the center line of the boss would result in a properly drilled hole without grinding. The gate has been moved and one grinding operation eliminated. See Fig. 5.

These examples indicate that by analyzing product design and the effect it has on our labor operations, we are able many times to simplify work and to reduce cost through



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minor changes in the design.

Process analysis is another general area of methods engineering. Simplification in this area often is possible as a result of equipment changes. Equipment manufacturers today are investing a great deal of money in the development of better and more productive machines.

Automatic devices which greatly reduce human effort and increase production are being designed into machines. Air cylinders, Fig. 1, are coming into common use as a method of conveying coreboxes in and out of machines. New molding machines use air cylinders to handle flasks and molds. Air is coming into more common use as a means of ejecting castings from press or grind fixtures.

In many cases the investment required limits the extent to which work can be simplified through equipment changes. It would not be practical to invest more money in an equipment installation than could be saved through reduced labor cost unless it was with the desire of improving working conditions. It is, of course, the responsibility of top management to weigh the intangible benefits of an expenditure such as this.

Equipment Simplifies Work

Several areas in which we have simplified work through equipment installations have been the charge floor, automatic shakeouts and mechanical handling of castings through cooling and sorting operations. Fig. 3 shows how an overhead loading chute allows fast and efficient loading of blast cleaning equipment. Figs. 8 and 9 illustrate disposal of castings from sorting conveyor to bin for hard iron chipping.

In past years, engineers have been attempting to subdivide and specialize operations. This attitude has been one of the contributing factors to the great increase in productivity over the years. In some instances, however, this attitude has resulted in overspecialization. As an example, let us examine the finishing of a motor end frame casting.

The finishing of the casting includes ring testing for cracks, chipping, grinding, burring and sorting. Three different men are used to perform these operations. It has become apparent, from a method analysis, that these men are not working effectively because of the large amount of handling required. Combining operations and having each man do the entire job of processing will eliminate much of the handling. It also will make the workers more effective and increase the flexibility of the work force because more people will know more jobs.

Another disadvantage of job specialization may be the monotony involved on the part of the worker. People performing the same task over and over may tend to become dissatisfied with their work, a situation which might lead to poor quality, absenteeism or disinterest in safety.

Movement analysis is another, very important part of methods engineering. In many instances, work in this area is co-ordinated closely with product or process analysis. Basically, movement analysis is aimed at reducing or eliminating ineffective manual movements from any operation. These ineffective movements may be caused by improper balance of work between hands, improper work place layout, improper sequence of operation, lack of job instruction or skill. By using the scientific techniques available, the industrial engineer can, through detailed study, improve almost any operation.

The coreroom has in the past been an area in which the methods engineer has spent much of his time. We have found, through an analysis of work place layout, that there is an angle at which a core machine should be set in relation to the oven conveyor. This angle makes the most effective use of the human movements involved in carrying cores to the conveyor and returning with driers. It also has been found that the height of the work table is important in reducing effort on the part of the operator.

Too low a table causes excessive bending movements, and too high a table may cause awkward reaching movements. Our oven conveyors have been installed in a manner aimed at reducing reaching movements. They travel "uphill" so that the first coremaker can put his cores on the upper shelves of the rack and the last coremaker can put his cores on the lower shelves. This arrangement eliminates much of the bending or reaching that would be necessary if the oven conveyor traveled horizontally.

Let us review briefly the prominent needs involved in establishing a program aimed at reducing costs through the control and simplification of work.

The first need is the standardization of operations and the calculation of efficiencies. This step will reduce labor costs, provide management with an effective control over plant performance and provide a basis for further improvement through methods analysis.

The second need is for people trained in the field of methods engineering and capable of scientifically approaching the problem of work simplification.

The third need is the development of an active interest in the program on the part of top management, supervisors and workers.

"I getta kick outta those posters . . . whatta they think we are . . . KIDS?"

Slag Control

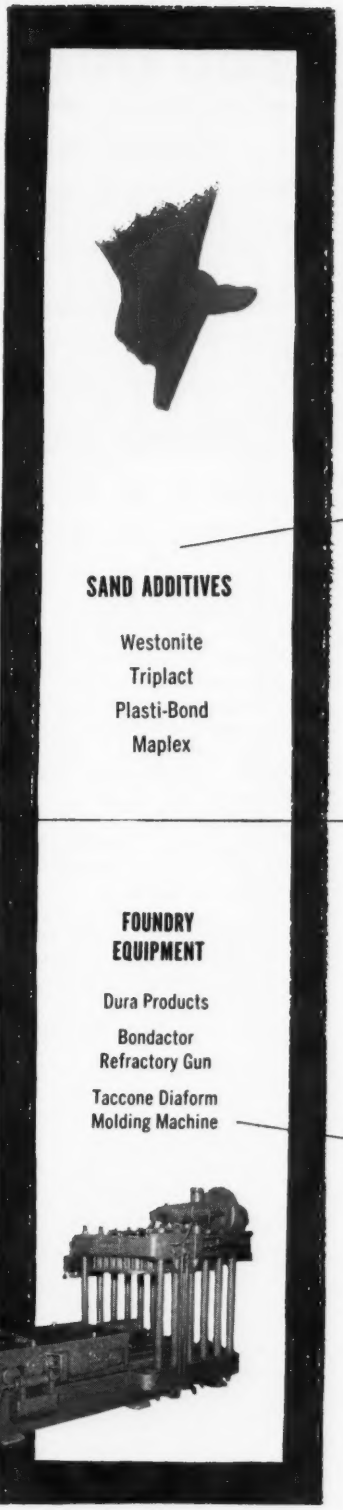
(*Continued from page* 87)

Of course, a scatter band of values would be expected owing to variations in cupola operating practice and silicon content of the charge materials. As iron oxide content increases, manganese loss from the iron does, too. Fig. 4 shows that a slag containing 6 per cent FeO is accompanied by a Mn loss of about 16 per cent, and a slag containing 20 per cent FeO is related to a Mn loss of around 38 per cent. High silicon and manganese losses in the metal or slags with high iron oxide and manganese oxide contents signify overblowing of the metal or a deficiency in limestone.

Witten establishes that cupola slags take up definite quantities of manganese and iron which are determined by the melting point of the lime-silica-alumina base mixture in the slag, by the lime-silica ratio and by the temperature developed in the cupola. The melting point curve of the lime-silica phase diagram indicates the direction in which the iron and manganese of the slag vary, the smallest amounts being absorbed in the vicinity of the low melting eutectics.

In cupola-melted cast iron, the intimate mixing of metal and slag may cause speculation on the distribution of oxygen between slag and metal. Of special interest are the experimental results for nine cupola heats. The nominal analysis at the spout was that of a typical automotive grade.

(*Continued on page* 242)



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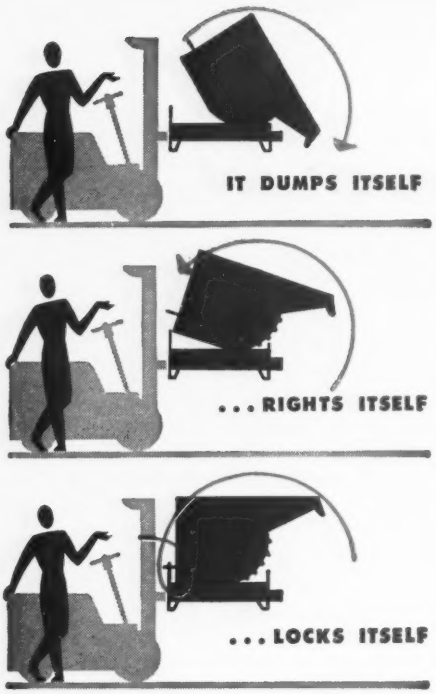

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(*Continued from page* 240)

about 3.20 per cent C and 2.10 per cent Si.

Cupola slag and metal samples were taken simultaneously from five to seven taps spaced through each heat. The metal specimens for vacuum-fusion analyses were poured in split steel molds that produced a clean pin, ⅜-in. in diam and 2 in. long. All collected slags were typical of commercial slags used in acid cupolas. The results of individual chemical analyses and gas determinations are correlated in Table I.

All heats produced irons with an average oxygen content between 0.0016 and 0.0026 per cent, correlating well with the equilibrium value of 0.002 per cent calculated for the silicon-oxygen reaction. However, certain taps in three of the heats produced higher values. The hydrogen and nitrogen contents appear to follow a similar trend to the amount of dissolved oxygen. Where a reduction in the iron oxide content of the slag occurred under any given operating condition, this reduction usually was accompanied by an appreciable change in the appearance of the slag.

Iron Oxide Contents Vary

The data show, for the limited range of oxygen contents, that iron oxide contents in the slag had a wide range, from about 3 to 14 per cent. Also, the reduction of iron oxide in the slag is not accompanied by any marked reduction in the oxygen content of the iron, and there is no consistent relationship between the iron oxide content of the slag and the oxygen dissolved in the iron. This means that the partition factor in cupola-melted iron is negligible. Further, there is no consistent relationship between the oxygen content of the iron and the gross silicon loss or between the oxygen content of the iron and the gross manganese loss.

When the oxygen content of the slag and its relation to the oxygen content of the iron are examined, two systems must be considered. First, there is the partition factor for the distribution of oxygen between the slag and the iron. Second, there is the deoxidation constant that determines the amount of oxygen which can exist in the iron in the presence of silicon.

The partition factor for the oxygen distribution between the slag and the iron indicates that a reduction in the oxygen content of the slag should be accompanied by a reduction in the oxygen content of the iron. This factor becomes important, however, only when equilibrium is attained and when the iron contains no deoxidizing elements.

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In the instance of cupola-melted irons, neither of these conditions may exist. A heterogeneous reaction, such as one between slag and metal, proceeds rather slowly because the slag-metal interface forms an effective barrier to rapid attainment of equilibrium. Many authorities on steelmaking consider that equilibrium between slag and metal is not reached even when they are held in contact for long times, as in an open-hearth furnace. Contact times between the slag and iron in a cupola are relatively short. For these reasons, the significance of the partition factor in cupola-melted gray irons is minimized.

Oxygen and Silicon React

On the other hand, the influence of the deoxidation constant on the oxygen content of the iron is pronounced. The reaction between the oxygen in the iron and the silicon in the iron is homogeneous and proceeds rapidly. With a rapid approach toward equilibrium with respect to the deoxidation constant and a relatively high silicon content in the iron, a relatively low oxygen content is expected in the iron, regardless of the iron oxide of the slag.

In a recent paper by Fleming[5], the reactions in the main sections of the cupola are discussed fully, with the proper emphasis placed on the hearth zone, where reduction can take place either by direct oxidation of carbon monoxide to carbon dioxide or indirectly as oxide-slag-coke reactions. Indeed, the zone below the tuyeres is perhaps the most important in the cupola insofar as slag-metal reactions are concerned.

Reduction to the elemental state can be realized when the drops of oxide-coated metal or oxide-bearing slag (tumbling over the incandescent coke) fall through the high temperature, high CO-CO_2 portion of a deep enough "well." The process may be delayed, if the element arrives in the slag and metal phases in the "well," until the reactions between oxide-slag-coke proceed there, but the ultimate result will be similar, given adequate reaction time. Secondary factors, which can promote these reactions, should be given due consideration. It obviously is undesirable that the cupola-well portion should be so shallow above the slag surface that free oxygen, (or a high carbon dioxide gas-phase) reoxidizes slag components at this interface or that the well depth should be so extreme that high heat losses unduly lower slag and metal temperatures.

Provision for adequate slag depth also helps to allow sufficient reaction time between the slag and the falling drops of metal, which present much

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better interface conditions because of the high ratio of surface area to weight than does the normal slag-metal (bath) interface. It is obvious that fluid slags are preferable to viscous slags. Where possible, slags forming complex and stable compounds with the oxides to be reduced should be avoided, and slags containing materials catalytic to desired reactions should be sought.

Desulphurization—It appears that lime, magnesia and the oxides of iron and manganese in the free state all can desulphurize molten iron and that their desulphurizing powers are probably equal. When these oxides are combined with acidic oxides to form compounds such as silicates, phosphates and aluminates, the desulphurizing power of the slag is reduced.

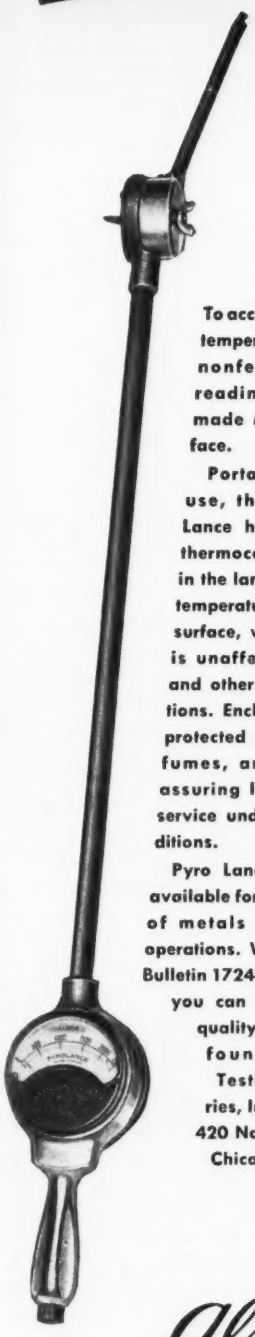
The "excess base" in a cupola slag is the most important factor for the migration of sulphur from metal to slag. The iron oxide content and the melting temperature of the fundamental lime-silica mixture produce significant effects. In other words, truly basic slags favor desulphurization of the metal. Temperature and slag composition affect the transfer because the fluidity of the slag is dependent on these variables. The fluidity of a slag certainly governs its ability to absorb sulphur.

Little can be done about sulphur control, in the true sense, in an acid-lined cupola, and although various opinions are expressed about the use of fairly high limestone additions in acid cupolas, the only effect on which opinion is fairly unanimous is a decided increase in lining wear. Several investigators have shown, however, that if the neutralizing effect of the acid lining is removed and truly basic slags are employed, low-sulphur iron can be produced consistently.

The mechanism of desulphurization works in two ways: 1. The slag dissolves the metallic sulphide from the metal until the amount of this sulphide in the slag is in equilibrium with the amount in the metal. 2. The metallic sulphide reacts with lime in the slag to produce calcium sulphide and iron oxide. This reaction can operate effectively only in slags in which "excess base" is available and low percentages of iron oxide already exist. Fig. 5, from data of Rocca, Grant and Chipman[6], shows this point admirably. Both 1 and 2 are really heterogeneous reactions which require time for attainment, or preferably "activity," which can be defined as any procedure that continually changes the slag-metal interface.

In acid cupola melting, "excess base" in the slag has no real significance, and any effect would be dependent upon slag composition limits.

in nonferrous foundries SURFACE INDICATIONS CAN BE MISLEADING



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It might be difficult to perceive how any desulphurizing could be accomplished with an acid slag. Though quite limited in degree, the effect is not totally absent; study of the ternary diagram lime-silica-alumina will reveal the base (fundamental) slag compositions that are likely to promote desulphurization.

In a top view of the liquidus surfaces, Fig. 4 shows that these compositions lie in the immediate vicinity of the ternary eutectics H, J, K and L. The eutectic H melts just under 1400° C and so is still rather high. Its location in the strongly acid region does not afford any degree of desulphurization. The eutectic J has the advantage of a higher lime content, and this observation is even more true with eutectic K. For eutectic L, the higher melting point and the nearness of the steep melting point increase on the basic side exert an unfavorable influence since there is not much latitude under commercial melting practice.

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EDITOR'S NOTE: Since this article was prepared, Mr. Loria has joined the Central Metallurgical Division, Crucible Steel Co. of America, Pittsburgh.

U.S. Chamber of Commerce Studies Small Business

Big and small businesses usually are not competitive but complementary according to a new study of the Chamber of Commerce. The report, "Small Business: Its Role and Problems," also reports that small business is becoming increasingly important to the U. S. economy. Mass production is adaptable only to a limited number of products. But small firms can cater to demands for specific, personal services and products.

The study gives information on size, share of income and position in the economy of the small businesses. Chief problems and sources of aid are described. The study may be obtained for 50 cents a copy from the Chamber of Commerce of the United States, Washington 6.

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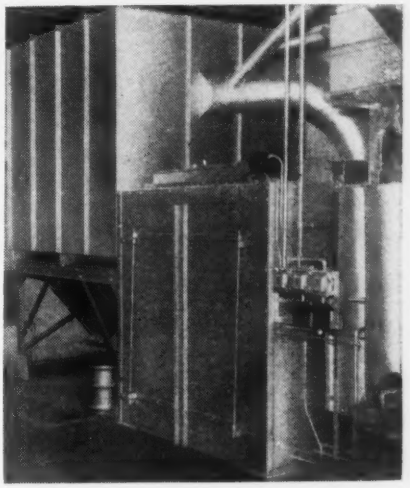

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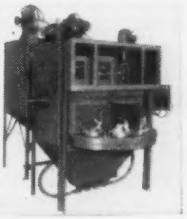

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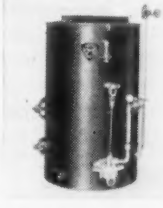

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Small Foundry Cleaning

(*Continued from page* 83)

the additional effect of reducing storage space requirements. When the cleaning room is able to keep up with the pouring floor, castings can be cleaned almost as fast as they cool, without the need to stack them up to wait for service. Production in the morning can be cleaned in the afternoon, and the afternoon production can be done by the next morning at the latest.

More Positive Quality Control—Demand for products increases not only because of the better appearance that more efficient cleaning affords, but also because of the better quality. More positive quality control prevails on the pouring floor as a result of being able to check gating, for instance. Perfectly clean metal makes it possible by visual inspection to see whether any slag is going up into the casting instead of being trapped in the gate. If inspection reveals imperfect slag trapping, the gate design can be revised before a large quantity of scrap castings is made.

Once castings have been poured, any pitholes, honeycombing, slag deposits or other common defects readily can be detected visually before the order is shipped to the customer, since automatic cleaning gives the same thorough treatment to all areas of the parts. Eliminating imperfect castings before they get to a customer's plant plays an important part in maintaining customer satisfaction, of course. And often the better quality of an automatically cleaned casting manifests itself in terms of increased tool life in the customer's machine shop. All these factors permit the small foundry to produce castings with "big shop" quality and finish and to serve customers with "small shop" service and courtesy.

More Work in Less Time—The economics of cleaning are improved. Automatic equipment can handle more individual pieces in a shorter time than manually-operated machinery can. Reduction of labor required to attend the equipment naturally makes it possible to reduce the cost of the product.

One foundryman reported that his cleaning room had always been behind schedule. He continually operated it overtime and Saturdays. He mechanized by adopting automatic airless blast cleaning and found it possible to complete his cleaning in only 1 to 1½ hours per day. The operator was used, of course, in other work during the remainder of the day. Cost of the automatic method was amortized by savings in overtime wages, and, at the same time, his products were improved quality-wise.

Another foundry operator summed his situation up like this: "We mechanized our cleaning department with an automatic abrasive blasting machine. It costs us about $1000 a year, including depreciation, abrasive, spare parts, and all the other costs connected with it. However, in view of the things it does for us, we consider our blast cleaning machine a salesman. It's always on call for duty, of course, whereas we couldn't get much of a human salesman to work for us for $1000 a year. We justified our purchase of this machine on the basis of the question, 'Can a small foundry pay $1000 a year for a full-time salesman that actually keeps business for the firm and gets business that the firm would otherwise never stand a chance of getting?'

Working conditions in and around the department are made more pleasant—a decided boon for foundries which have a hard time finding workers to take certain manual cleaning jobs. Besides eliminating many tedious operations, automatic cleaning makes dust control more positive, and plant work areas can be kept much cleaner. In addition, a number of small foundries with automatic cleaners take advantage of the extra cleaning capacity to increase their incomes further by performing job cleaning work in several applications.

Better Materials Handling—One factor important to both increased economy and worker satisfaction is improvement of the materials handling situation. Individual handling of castings both before and after cleaning can be eliminated since many airless blasting machines are equipped with selfloaders and many unload automatically. Since these automatic machines turn the work during the cleaning operation, materials handling is alleviated further. Where heavy and bulky parts constitute the cleaning problem, much loading and unloading labor is saved by employing a machine designed for convenient use of a jib crane or a lift truck. With certain types of automatic machines, all kinds of castings can be handled, making it possible to consolidate all cleaning work in one cleaning method.

"I picked up the idea of the 'bottom board' from my Father."

Two Kinds of Equipment—In general, automatic blast cleaning equipment suitable for small foundries falls into two classes. One is the tumble-blast type, employing the airless blasting principle in conjunction with tumbling. The other is the table-blasting type. In both, cleaning is done by metallic abrasive hurled upon the work at very high velocity. Hurling is done by one or more rotating bladed wheels mounted within the cabinet. These throw the abrasive by centrifugal force alone, with no other propelling force required.

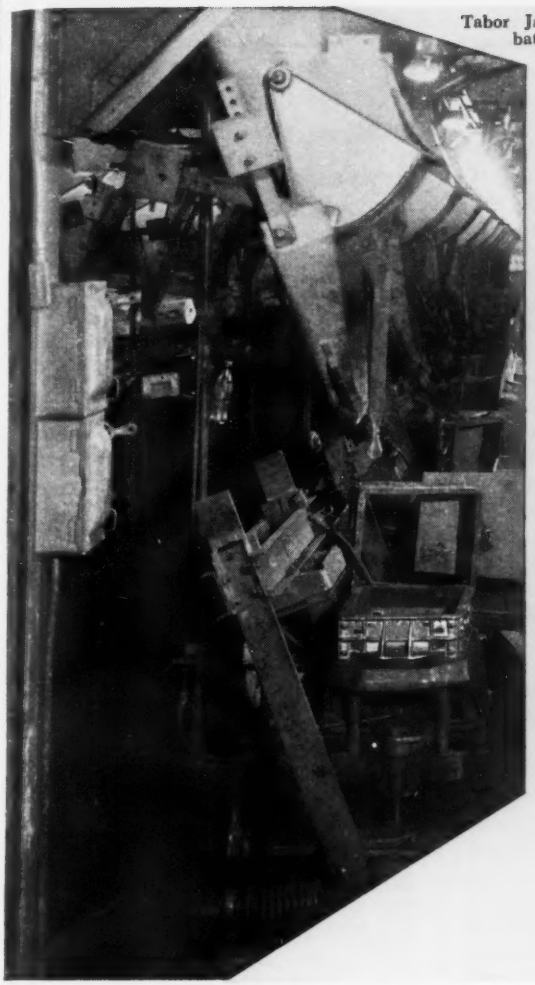
Foundries where the total production is composed of small, compact castings able to withstand a gentle tumbling action usually use the tumble-blast type of machine. Hundreds of small castings can be cleaned at once in this unit in from around one-half minute for metals like aluminum up to an average of five minutes for gray iron.

Shops which produce castings of odd or irregular shape or which have a varied production with both small and large work usually need the table-type machine. Other factors making the table-type necessary would be fragile areas in castings or considerable open work in them. The swinging table design has proved most satisfactory for the small foundry because of its great versatility and the ease and speed with which it can be loaded and unloaded. A table can hold either one or two large castings or hundreds of smaller ones at once.

In the tumble-blast cleaner, the blasting compartment is formed by a continuously moving, belt-type conveyor. This conveyor turns the parts over in the blast of abrasive from the wheel in the roof of the compartment.

In the swing-table type model, the work conveyor consists of a plain, circular table mounted on the door of the cabinet. When the door is opened, the table comes out into the room, where it is accessible to a jib crane or a lift truck for loading or unloading. When blasting is to be done, the table moves automatically into the blast chamber when the door is closed, and the table rotates under the blasts of abrasive from one or more of the

(*Continued on page* 248)



Tabor Jar-Squeeze Flask-Lift Machines — three batteries of twelve 13" units — installed at Grinnell Company, Inc., Cranston, R. I. At right, similar Tabor machine at work for Acheson Manufacturing Company, Braddock, Pa.

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The original manufacturer of automatic controls for sand systems.

(*Continued from page* 246)

abrasive-throwing wheels. These are mounted either in the roof or the sidewalls of the machine.

Case Studies—The experience of a job shop employing 18 men to produce scores of different kinds of brass, bronze and aluminum sand castings is typical. Cleaning production averages 15,000 lb of metal per month, with many of the castings intricately and deeply cored. The cleaning room has three people assigned to it, two of whom spend less than full time in that department. One operator tends the automatic blast cleaning machine less than an hour a day, and there are two grinders, one full-time and one part-time.

The cleaning machine is one of the tumble-blast type, with a 2-cu-ft capacity. It holds about 250 lb of brass or between 50 and 100 lb of aluminum. All brass is cleaned for three minutes before grinding and for one or two minutes after grinding. The latter cleaning blends out the grinding marks and produces a finish with good sales appeal.

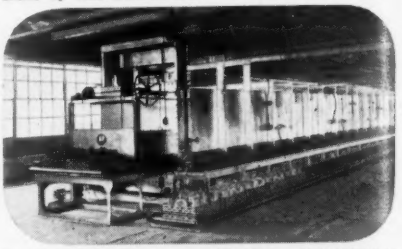
Aluminum is cleaned only after grinding. Most of these parts are blasted only 30 seconds per batch, this length of time being sufficient to remove all clinging sand, blend out grinding lines and leave an attractive finish for sales. On very intricately and deeply cored aluminum, the blast occasionally takes as long as one minute per batch.

Owners of this shop report that the possibility of better inspection let them double their brass business as a result of better appearing, higher quality castings. At present, this shop regularly is operating 45 hours a week.

Another job producer of brass, bronze and aluminum castings employs between 40 and 45 people and turns out 50 to 60 tons of finished castings per month. The cleaning room employs three grinders, one filer, one cutoff man and the cleaning department foreman, who operates the 5-cu-ft blast cleaning unit. It is of the automatic tumble-blast type and takes care of the daily cleaning work in from 1 to 1½ hours. This production would be an average of ten machine loads of work per day, with the blasting time per load from four to ten minutes.

Among the more important points cited by the management of this foundry is the complete elimination of overtime labor in the cleaning room. The delivery situation is improved because the morning's pouring can be cleaned in the afternoon and the afternoon's the next morning. Favorable comment was received immediately from customers because the better surface gave them increased tool

EF DOUBLE CHAMBER CAR TYPE FURNACE for annealing castings, equipped with three furnace cars and one transfer car incorporating car puller. Built by The Electric Furnace Co., Salem, Ohio.



EF ELECTRICALLY HEATED CONTINUOUS ROLLER HEARTH FURNACE for the scale-free annealing of various iron alloy castings in special atmosphere. Built by The Electric Furnace Co., Salem, Ohio.

EIGHT EF FUEL-FIRED BATCH TYPE FURNACES, showing gantry crane that handles the large, heavy castings into and out of the furnace and quenching equipment. Built by The Electric Furnace Co., Salem, Ohio.

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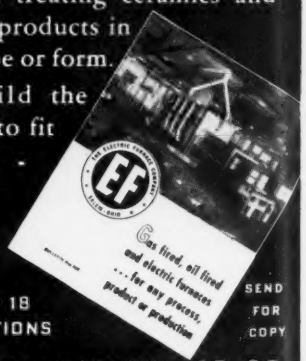

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The ELECTRIC FURNACE CO.
Salem - Ohio

life in machining operations. Total cleaning costs were reduced by a factor of one-half.

Another foundry employs airless abrasive blast cleaning to achieve a uniform, lustrous finish on its sand-cast aluminum electrical castings. Such parts as junction boxes, cages for light bulbs, fixtures for light globes, cable clamps, connectors and fittings for conduits, including vapor-tight, explosionproof boxes, are given this treatment. Parts weigh from a few ounces up to about 5 lb.

Typical loads of castings are given five minutes of automatic blasting. One man operates the 2-cu-ft airless blaster part of each day to clean about 1200 lb of castings. He operates other machinery the rest of the time. All clinging sand and burned-in dirt are removed; ground areas are deburred; grinding lines are blended out; and shininess on ground areas is removed. The result is a uniform, over-all aluminum-type lustre.

In gray iron foundries, a typical shop produces a great variety of parts ranging in weight from a few ounces apiece up to 1500 lb. This foundry employs 27 men, with a cleaning department complement of one airless blasting machine operator part-time and two full-time grinders. The operator of the airless blasting machine cleans the 12,000-lb production in five hours each day and is used the rest of the time in other work.

Because of the wide variety of work to be handled, a table-type blaster was chosen. It has a 72-in.-diam work table for accommodating all sizes of parts produced by the company.

Through automatic cleaning machinery, the foundry experienced savings of over $850 per month in man-hour costs, and it eliminated all losses due to breakage during cleaning.

At a second gray iron plant, a table-type airless blasting machine handles 7 tons of castings per day in from 4 to 5 hours, whereas 8 to 12 hours per day with the former cleaning method was not enough. One product, for example—a gray iron ice cream freezer base weighing 640 lb and measuring 40 x 36 x 36 in.—now is cleaned in six minutes, along with enough miscellaneous castings to fill the table. This particular cleaning job, including loading and unloading, formerly took 5½ hours by another, non-automatic method. Savings through the complete elimination of breakage were experienced on another production piece, a 60-lb feeder guide for milk bottle washing machines. With the former method, 50 per cent of production had to be scrapped because of breakage during cleaning.

The question naturally arises as to which type of automatic equipment is best for a given application. Although general recommendations can be given as a result of data assembled from many operating installations, special problems require special treatment. For this reason, it is desirable to run an actual test on the work before equipment is purchased. In this way, the size and model of equipment needed can be determined scientifically, as well as the size and kind of abrasive to be employed in the process. All this can be determined before money is invested. Most reputable manufacturers of blast cleaning equipment have these demonstration laboratories in their plants. They are equipped with actual production models of equipment for tests on all work.

Acknowledgment—Foundries from which data for this article were secured include: Adalet Mfg. Co., Cleveland; Chicago-Dubuque Foundry Corp., East Dubuque, Ill.; Nelson Foundry Co., Morton Grove, Ill.; Nichols Foundry Co., Hammond, Ind.; and Sheboygan Castings Corp., Sheboygan, Wis.

ACTUAL COST FIGURES!

WITH OLD STYLE GRINDERS
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$3.36
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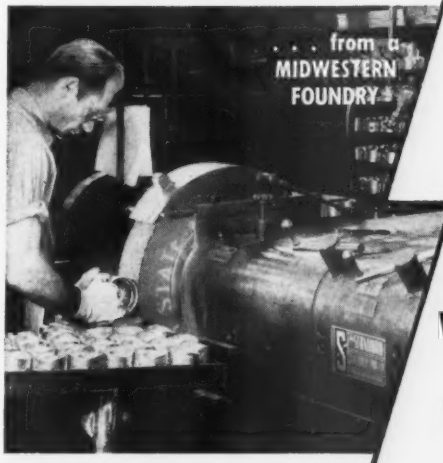
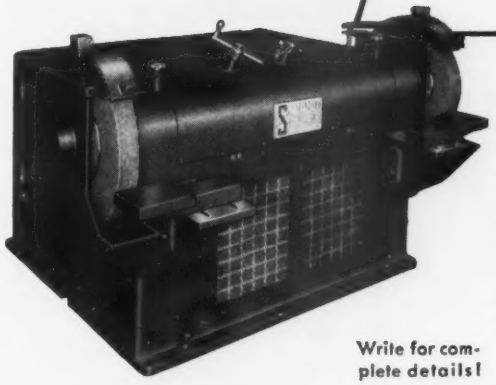


WITH STANDARD
INFINITELY VARIABLE SPEED
SNAGGING GRINDERS
WHEEL COST PER TON
$2.34!
WHEEL COST PER
100 UNITS
$1.21!



We will be pleased to forward the report containing these actual cost results from a midwestern steel foundry after installing STANDARD infinitely variable speed Snagging Grinders.

The report is typical of many others in our files representing all types of foundries . . . reports that make Standard Grinders outstanding in effecting HIGHER PRODUCTION with LOWER COSTS.

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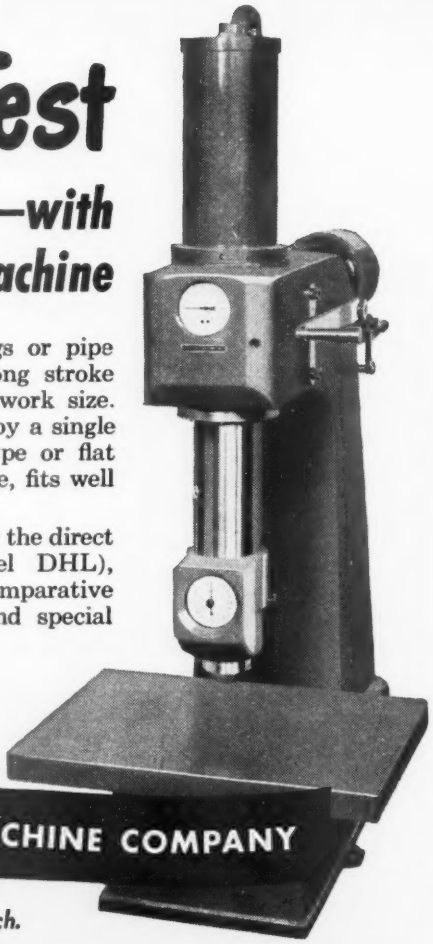
large pieces fast—with this long stroke machine

Large awkward castings, forgings or pipe are easily tested because the long stroke eliminates screw adjustment to work size. The hydraulic ram is controlled by a single lever. Large, stationary roller-type or flat table makes work handling simple, fits well into a conveyor line.

Choice of plain Brinell machine or the direct reading machine (shown, model DHL), where dial at end of ram gives comparative hardness immediately. Larger and special machines may also be had.



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nothing but praise for the REDA FURNACE . . .

has improved overall foundry operation . . .

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much more flexible . . . entirely satisfactory .

castings come cleaner . . .

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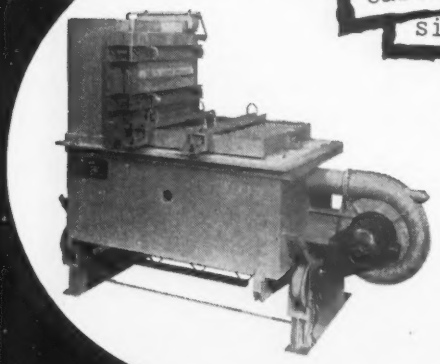

Reda Stack-Loading melting furnaces for ferrous and nonferrous metals have been designed and built by experienced foundrymen for foundrymen everywhere. That is why Reda furnaces provide advantages far beyond those found in other, and more expensive types; that is why, with Reda furnaces there is less down time for maintenance, longer uninterrupted melting runs, and lower melting costs.

Another feature is the Reda Burner arrangement which can operate from oil and gas simultaneously or be switched from one fuel to the other instantly. *Write or phone for complete details.*

REDA FURNACE

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TRADE PUBLICATIONS

For More Details Use Reply Card—Page 209

SAND CONVEYING: Turbo-Drive Division, Crane Co., 836 South Michigan Ave., Chicago 5, Ill.—Pneumatic conveying system for sand is described in an eight-page bulletin. Operational features, dimensional data and specifications are included. Five installations of the system in foundries are pictured.

For More Details Circle No. 141—Page 209

BLAST CLEANING: American Wheelabrator & Equipment Corp., 1102 South Byrkit St., Mishawaka, Ind.—Case history of a large steel foundry which cleans 2 to 3 tons of miscellaneous steel castings in 15 minutes with a 63-cu-ft airless blast tumbling machine is given in bulletin 744-2. Complete details of the installation are included.

For More Details Circle No. 142—Page 209

TEMPERATURE CONTROL: Burling Instrument Co., 16 River Road, Chatham, N. J.—Bulletin 105 describes dual temperature controls which incorporate two independent electric switches. Operation is by the differential expansion of solids (two concentric tubes) and no filled bulb or capillary tubing is used.

For More Details Circle No. 143—Page 209

WELDING CASTINGS: Linde Air Products Co., Division of Union Carbide & Carbon Corp., 30 East 42nd St., New York 17, N. Y.—Number 1, volume 34 of a quarterly magazine, *Linde Tips,* gives information on welding white metal castings and the repair of gray iron castings.

For More Details Circle No. 144—Page 209

DIECASTING MACHINE: A. B. C. Die Casting Machine Co., 339 West 112th Place, Chicago 28, Ill.—Specifications and features of a diecasting machine built for shops specializing in castings of one pound or less are given in an illustrated folder.

For More Details Circle No. 145—Page 209

CONVEYOR BELTS: Main Belting Co., 1241 Carpenter St., Dept. 73, Philadelphia 47, Pa.—Detailed specifications of a line of solid woven, rubber and stitched canvas conveyor belts are described in a new four-page catalog.

For More Details Circle No. 146—Page 209

NICKEL ALLOY IRONS: International Nickel Co., 67 Wall St., New York 5, N. Y.—Bulletin A-115 gives the heat treatment fundamentals of nickel alloy cast irons. Charts and tables are included.

For More Details Circle No. 147—Page 209

FOUNDRY OVENS: Michigan Oven Co., Detroit 1, Mich.—Bulletin 1152 illustrates conveyor, car, rack and roller drawer core ovens. Diagram pictures engineering features of the ovens.

For More Details Circle No. 148—Page 209

PYROMETERS: Bristol Co., Waterbury 20, Conn.—Bulletin P1244 covers millivoltmeter pyrometers and accessories. Included are indicating py-

rometers for service up to 4000° F, indicating controllers, portable indicating pyrometers and pyrometer switches for use when a single indicator is intended to monitor temperature measurements from more than one station.

For More Details Circle No. 149—Page 209

INDUSTRIAL EQUIPMENT: Precision Equipment Co., 3682 North Milwaukee Ave., Chicago 41, Ill.—Line of lockers, ladders, steel shelving and storage and maintenance equipment for industrial and institutional uses is described in a 24-page catalog.

For More Details Circle No. 150—Page 209

CAR SPOTTER: Link-Belt Co., 307 North Michigan Ave., Chicago, Ill.—Car spotters which enable one man to spot six loaded railroad cars at one time are described in book 2092. The spotters consist of a vertical capstan, helical and worm gear drive, heavy housing and integral motor. Car pullers also are described. Engineering information, instructions for calculating rope pulls and typical layouts for both car spotters and car pullers are given. Many tables and diagrams are included.

For More Details Circle No. 151—Page 209

AIR FILTER: Mechanical Industries Inc., 905 Grogan Bldg., Pittsburgh 22, Pa.—Bulletin No. 4 describes a filter for cleaning hot, wet and corrosive gases and air. Dust, dirt and impurities are removed by passing gases through cells containing moving granules.

For More Details Circle No. 152—Page 209

TRACTOR ATTACHMENTS: Frank G. Hough Co., 703 Seventh St., Libertyville, Ill.—New literature, "Useful Attachments for Payloader Tractor Shovels," describes 16 available attachments. Line of tractor-shovels also is illustrated.

For More Details Circle No. 153—Page 209

STEEL RAMPS: Penco Engineering Co., 25 California St., San Francisco 11, Calif.—Design, construction, safety side guards and positive locking are among the features emphasized in a new steel ramp bulletin.

For More Details Circle No. 154—Page 209

AUTOMATION: John C. Whiddett Co., 9 Union Ave., Bala-Cynwyd, Pa.—Packaged control system and representative problems and their solutions are described in a new pamphlet.

For More Details Circle No. 155—Page 209

LEVEL INDICATORS: Convair, Pittsburgh, Pa.—Level indicators which operate in any position are dimensioned, illustrated and described in folder.

For More Details Circle No. 156—Page 209

PRECIPITATOR CLEANING: Research-Cottrell Inc., 405 Lexington Ave., New York 17, N. Y.—Magnetic

Let this inexpensive test show you how to

ELIMINATE PREMATURE SLAGHOLE FAILURES

Install a durable CARBOFRAX® silicon carbide slag hole block in one of your cupolas and see how long it outlasts ordinary blocks. Users report 20 or more hours uninterrupted service in continuous pour cupolas... with practically no change in hole size. Single standard size CARBOFRAX block costs only $4.70. Other sizes are available from stock molds. Order one today, put it in and keep a check on downtime. You'll order more! Address Dept. AA25, Refractories Division, The Carborundum Company, Perth Amboy, N. J.

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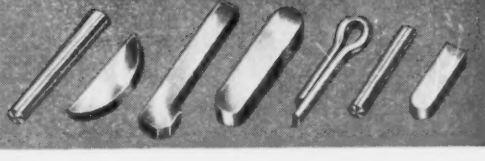

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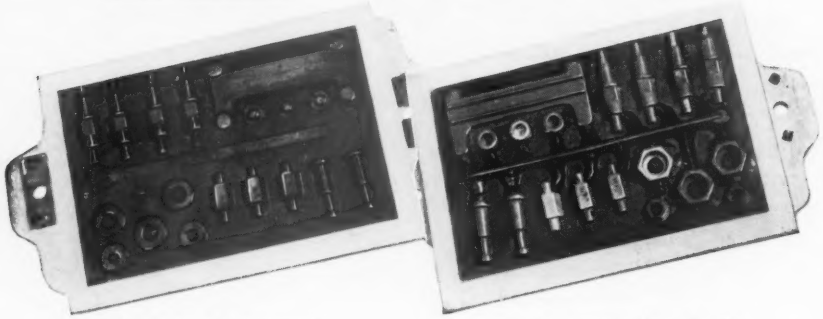

● Wide variety of items made into combination match plate with metal patterns mounted in drag side.

● The cope side of this "nuisance" job is made entirely of SUPER TAMASTONE.

How SUPER TAMASTONE solved a "nuisance" job!

From single loose wooden patterns furnished by customer, white metal ones were made in multiples to balance out a short combination run. By converting these loose pattern odds and ends into a SUPER TAMASTONE Match Plate, the customer received work in record time at a big savings! The foundry was happy, too, another "nuisance" job out of the way, and profitably!

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PRODUCERS OF: *Aluminum, Brass and Bronze, and Zinc Ingot; Hardeners, Z-shot and bar for Zamak production, Salloy, Special Alloys.*

"Better Alloys for Better Castings Thru Creative Metallurgy"

impulse for automatic and continuous cleaning of the collection electrodes in a Cottrell electrostatic precipitator is described in a six-page bulletin. Included is a schematic diagram of the rapper, an explanation of its basic operating principles, illustrations of its components and a summary of its features.

For More Details Circle No. 157—Page 209

BELT CONVEYORS: Stephens-Adamson Mfg. Co., Aurora, Ill.—Pre-engineered belt conveyor unit designed for customer assembly from prefabricated components is described in bulletin 1454. The unit is available in both 18 and 24-in. sizes with capacities ranging up to 150 and 250 tons respectively. Each sectional component is illustrated and the requirements for an installation listed. Features of components are given and a picture of an operating installation is included. Other material handling devices are covered.

For More Details Circle No. 158—Page 209

HANDLING EQUIPMENT: Barrett-Cravens Co., 4611 South Western Blvd., Chicago 9, Ill.—Fork trucks, electric trucks, batteries and chargers, hand lift trucks, skids, boxes, stacking frames, elevators, pallets, dollies and many other material handling devices are described in pocket-size catalog 535.

For More Details Circle No. 159—Page 209

AIR CONTROL UNIT: Bellows Co., 222 West Market St., Akron, O.—Bulletin AV300R shows installation photographs and describes in detail all parts and functions of a packaged air control unit.

For More Details Circle No. 160—Page 209

OFFICE LIGHTING: Sylvania Electric Products Inc., Lighting Fixtures, Wheeling, W. Va.—Economics and mechanics of good office lighting are covered in a new booklet written in nontechnical language.

For More Details Circle No. 161—Page 209

FORK TRUCK SAFETY: Clark Equipment Co., Industrial Truck Division, Battle Creek, Mich.—Cartoons illustrate do's and don'ts of safe handling of fork lift trucks. Title of booklet is "Safety Saves."

For More Details Circle No. 162—Page 209

VACUUM LIFT: Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.—Form 5147 describes a vacuum cup lift which eliminates the use of slings or hooks.

For More Details Circle No. 163—Page 209

TOOL ROOM GRINDING: Bay State Abrasive Products Co., Westboro, Mass.—Diamond wheels for tool room grinding are described in a tool room grinding wheel brochure.

For More Details Circle No. 164—Page 209

PROTECTIVE ATMOSPHERES: General Electric, Schenectady 5, N. Y.—Bulletin GEA-5907 describes the

use of protective atmospheres to prevent deterioration of metals during various heat treating processes. Tables help in selecting the correct protective atmosphere for each job and in explaining the compositions and costs of producing typical protective atmosphere gases.

For More Details Circle No. 165—Page 209

FLEXIBLE COUPLINGS: Ajax Flexible Coupling Co., Westfield, N. Y.—Pocket-size bulletin 57 contains ratings, drawings, specifications, service factors and information on various uses of rubber-bronze-bushed flexible couplings.

For More Details Circle No. 166—Page 209

WEIGHING INSTRUMENTS: Martin-Decker Corp., 3431 Cherry Ave., Long Beach 7, Calif.—Hook scales, tensiometers, crane weight indicators, lift-truck scales, logweighers, load cell check valves and stroking diagrams are shown in bulletin M-15.

For More Details Circle No. 167—Page 209

STEEL BUILDINGS: Sales Center, Brookville Mfg. Co., Brookville, Pa. —Bulletin 101 details the uses of pre-engineered steel buildings in American construction.

For More Details Circle No. 168—Page 209

LIFT TRUCK: Hyster Co., 2902 N. E. Clackamas St., Portland 8, Oreg.—New brochure, form 1287B, describes a 15,000-lb capacity lift truck. Action photographs, data and specifications are included.

For More Details Circle No. 169—Page 209

FOUNDRY reprints

Wet Sand Reclamation by Hubert Chappie relates how one foundry cut costs while maintaining casting quality by installation of a sand reclamation unit. Here's the complete report, including cost and savings figures, of one foundry's experience with advice as to how to further improve the system.

For a Copy Circle No. 170—Page 209

Safety Works If You Work at It by H. A. Forsberg describes a top management safety program that enabled each of three foundries to reduce its accident frequency rate sharply. Constant vigilance of all supervisory personnel and co-operation of employees are the key to success.

For a Copy Circle No. 171—Page 209

Automation in the Foundry by Wm. E. Dougherty presents in question-and-answer form the consensus of progressive foundrymen on making foundries automatic. Where to start in modernizing present facilities and problems of automation are some of the factors covered.

For a Copy Circle No. 172—Page 209

RENT OR BUY
SILENT HOIST
LIFTRUK
on the
"DAY-BY-DAY
EARN-ITS-WAY
PLAN"

3-5-7½-10-15 ton
CAPACITIES

Exclusive-
FLUID DRIVE

If you can reasonably use a Heavy Duty LIFTRUK for at least two hours a day average, to improve the movement of goods in process or reduce materials handling operations, then you should be interested in this unusual "rent-or-pay-as-you-use" plan. Proper cost accounting methods often show that man-hours saved, storage space gained, or time in transit reduced, add up to a profit well above the payments required for LIFTRUK for purchase or rental charges.

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Write for "Earn-Its-Way" Plan to

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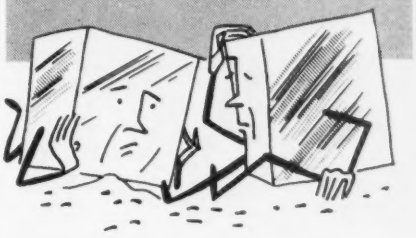
885 63rd Street, Brooklyn 20, N. Y.

The case of the grounded ice cubes...



The operations of a Buffalo ice-making plant came to a costly impasse. Ice cubes were grounded for want of some way to unclog their transporting devices. Hammering was slow and often damaging to the equipment.

There was a solution, however, that solved the problem economically and swiftly . . . a CLEVELAND vibrator.

Let us know about ***your*** *grounded material, or ask for our detailed literature. Engineering recommendations without cost or obligation.*

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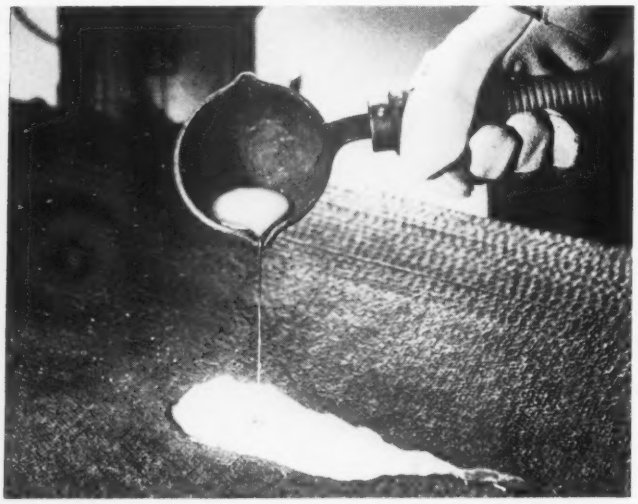
THE SHAKEOUT

Conveyor Belts Made To Withstand Heat

CONVEYOR BELTS have an easy time of it in some industries, but they need to be tough to stand up under the work they do in foundries, where heavy, abrasive, tearing, hot loads are more the rule than the exception. As illustrated in the accompanying photograph, Dandux



conveyor belts, manufactured by C. R. Daniels Inc., stand up under the punishment of a 700° F stream of molten lead poured directly on the stitched canvas surface. In operation, such belts are said to have carried daily loads of 30,000 tons of caliamite at a temperature of 900° F.

Special materials and constructions are incorporated in the belts. The materials include asbestos inner-weaving, inter-weaving and sewing materials, plus a company-developed impregnating compound. Extra lock-stitched rows reinforce the edges, ply core is inner-sewed and lock stitched, and both cover and core are double sewed with a lock stitch.

For More Details Circle No. 197—Page 209

Price Tags Make Workers More Careful

PRICE TAGS on production equipment and tools at the Industrial Truck Division, Clark Equipment Co., Buchanan, Mich., have increased production workers' respect for their machines and tools. Men were more careful than they had been when they realized that a machine cost as much as $22,000, like the one shown here, or that

reamers cost as much as $18.72 each.

As a direct result of this educational program, Clark's tool breakage expenses at its Battle Creek, Mich., plant have been reduced by 20 per cent, and there has been substantially less downtime for maintenance and repair.

For More Details Circle No. 198—Page 209

Investment Casting Slashes Costs

INVESTMENT CASTING has slashed by 50 per cent the cost of an aircraft part used by Glenn L. Martin Co., Baltimore. In making spacer blocks to support the skins at the leading edge of aircraft inboard flaps, Martin formerly machined the parts from 75S-T6 aluminum alloy bar stock.

These spacer blocks now are investment cast of 356-T6 aluminum alloy by National Precision Casting Corp.,

Clifton Heights, Pa. Elimination of the numerous machining operations not only cuts the cost in half, but surfaces of the investment-cast parts are so smooth that not even polishing is required.

For More Details Circle No. 199—Page 209

Interlocked Ingots Form Compact Bundle

ALUMINUM ingots cast in such a form that they interlock when gathered into a bundle are a new offering of Reynolds Metals Co., Louisville. The interlocking reduces

the amount of handling required in their handling and saves time for plant workers.

The bundle shown here, secured by a single steel strap, still is firm even though it just has been dropped to the floor from the full height of a fork lift truck.

For More Details Circle No. 200—Page 209

Master Power

HARD CHROMED • PORTABLE PNEUMATIC TOOLS

DO MORE WORK AT LESS COST

because they deliver more power per cubic foot of air consumed, are light in weight for easier maneuverability and they retain their new tool power longer.

ARE PREFERRED BY OPERATORS

because they are lighter in weight, better balanced and designed to reduce shock and be free from vibration.

IF YOUR PROBLEM INCLUDES

chipping, ramming, grinding, buffing, sanding or wire brushing, *write us today for full particulars.*

THE MASTER PNEUMATIC TOOL COMPANY, INC.

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SALES • SERVICE • STOCK • COAST TO COAST

PENN BUCKETS

Careful balancing makes Penn Buckets self dumping when loaded and self righting when empty. Welded construction prevents "clinging" makes them empty easily and completely.

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Self-Dumping

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION MEMBER FEMA

PENN IRON WORKS, INC.

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with COLUMBIA-SOUTHERN SODA BRIQUETTES

The size and shape of Columbia-Southern Soda Briquettes have been scientifically designed to do a faster, better desulphurizing job in Blast Furnace and Foundry operations.

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Compiled by Ed Bremer, FOUNDRY Metallurgical Editor

This extensive glossary of foundry terms was compiled from a wide variety of sources. Arranged in handy booklet form, it is a valuable reference for every foundryman. *48 pages.* $1.00

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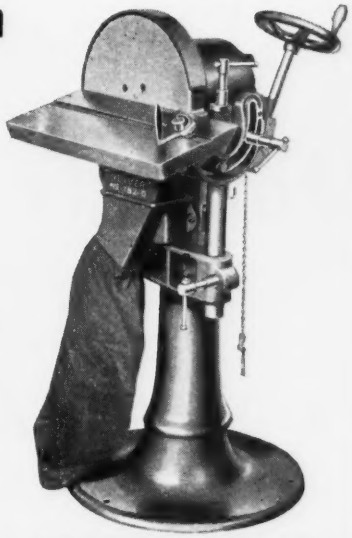
Let this low-cost "OLIVER" Disk Sander cut pattern shop costs!



This "Oliver" 15-inch Disk Sander will help your patternmakers do their work in less time. Fine for sanding angles, segments, core print and circular work. Table 9¼" x 21¾" is machined and grooved to take angle gauge, and circle, segment and duplicating gauge. Table tilts 45° down, 25° up. Write for Bulletin No. 182D.

"Oliver" makes a full line of woodworking equipment for pattern shops.

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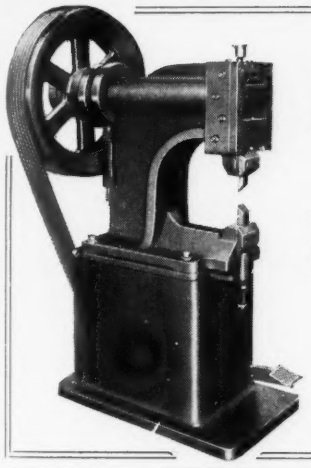
Established 1890 — GRAND RAPIDS 2, MICH.



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Sprue Cutter

for Non-Ferrous Metals

- Fast Clipping Action
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TWO SIZES

H—¾" square, or ⅞" rd. common brass

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Easy and simple to operate. Any workman can operate at top speed. Simple rugged construction for long life and trouble-free operation.

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USE THE KING PORTABLE *To Make Standard Brinell Tests*

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The King PORTABLE BRINELL is guaranteed to make Brinell tests of the greatest accuracy on large and small parts of almost any shape. In addition, this versatile unit:

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TISCO Replacement Blades to fit Wheelabrators* have given extra dividend service up to five times the life of other blades.

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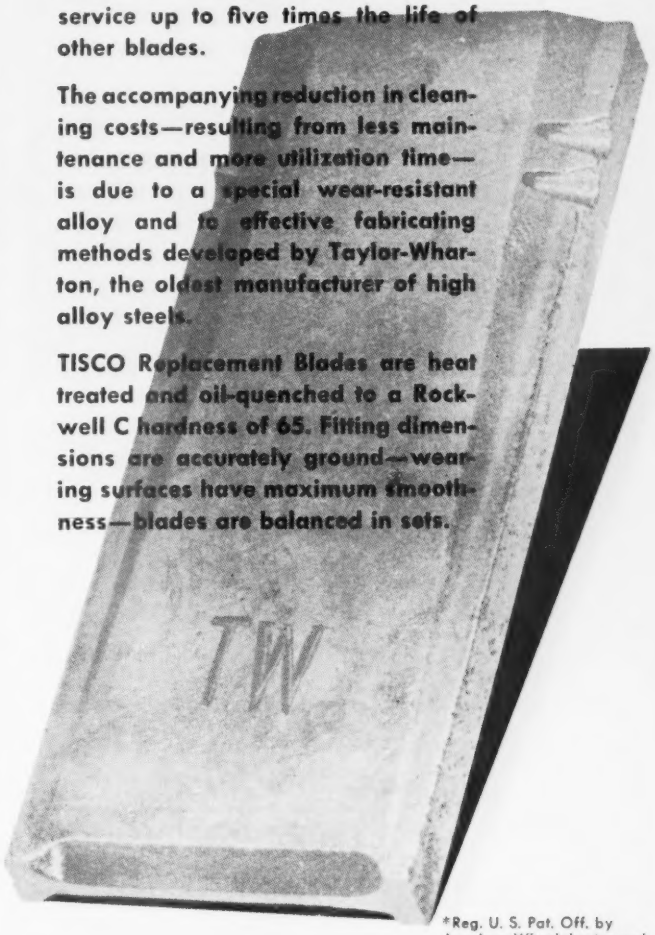

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TISCO Blades are carried by foundry dealers throughout the United States and Canada.

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TW

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CHECK THESE FEATURES
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Sample Can	$ 2.00
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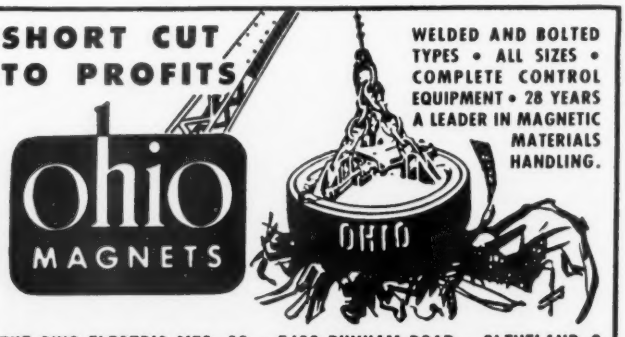

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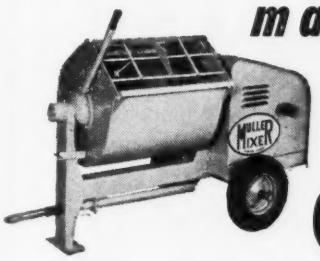

You can save time and money and make better cores with the Muller New 3½ Cubic Foot Core Sand Mixer. It mixes 250-300 pounds per batch. Better cores mean better castings. This new, labor-saving Core Sand Mixer will "buy itself" out of savings in a short time.

PRICE: $356.00 complete with 1½ H. P. Electric Motor ready to plug in, F. O. B. Metuchen, New Jersey.

This Mixer is also available in 2, 6, 6 to 8, and 9 Cubic Foot sizes.

MULLER MIXER

MULLER MACHINERY COMPANY, Inc.

Metuchen 14, N. J. Cable Address: MULMIX

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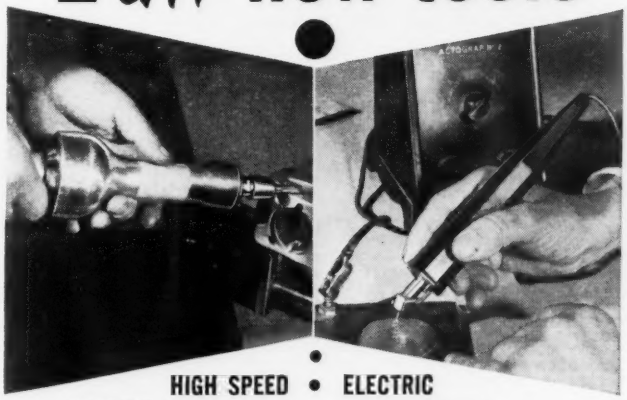

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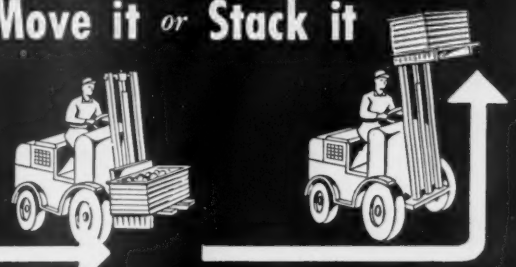

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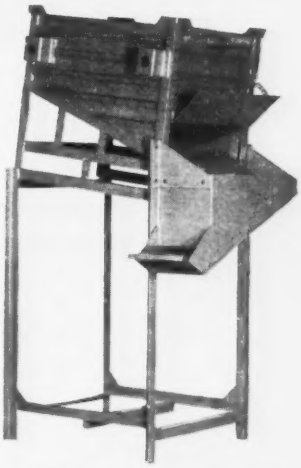
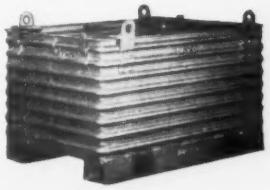
With Lift Door, Combination Stand and Discharge Hopper. Engineered to let gravity bring parts down to correct working height. There are no work interruptions or parts "jam up" where this BRUSCO Unit is working for you. Hopper is interchangeable for right or left flow of material. Send for the descriptive, complete line BRUSCO Bulletin and name of your local representative.





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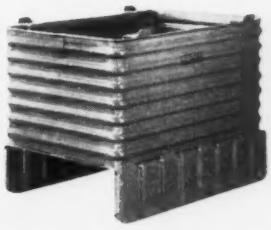

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BRUSCO Corrugated Skid Boxes

Also manufacturers of:

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OVER A MILLION IN USE . . .

The Hamilton Spray Gun

$15
1/8" and 1/4" pipe size F.O.B. Hamilton, Ohio

For spraying molds and cores with liquids, for cleaning motors and machinery, for laying dust, spraying hot roofing material, and for many other uses. Instant trigger control. Unit shipped complete with 4½ ft. length of suction hose and sinker. Guaranteed.

A squeeze of the trigger and the Murphy Pistol Sprayer instantly shoots a stream of blackening into inner pockets that could never be reached by old-fashioned brush or swab method. Designed by a foundryman, the Murphy Pistol Sprayer is ideal for cleaning permanent molds—aluminum and other metal, and for sand blasting.

Pipe size	1/16"	1/8"	1/4"	3/8"	1/2"
Price F.O.B. Hamilton, O.	$15.00	$15.00	$15.00	$17.50	$22.00

Prices complete with 5 ft. suction hose

EXTRA LONG NOZZLES FOR 3/8" SIZE

This size Sprayer can be furnished with nozzles up to 48" long for spraying ingot molds and hard to reach places . . . also available with curved nozzles up to 15" long.

Long Nozzle Sprayer $22.00

Write for descriptive literature.

$15
1/16" to 1/4" pipe size
Any length nozzle desired

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Help Wanted

WANTED

STEEL FOUNDRY SUPERINTENDENT

For well established foundry in the Southwest expanding facilities to manufacture steel castings. Prefer graduate engineer 35 to 55 years of age thoroughly experienced in all phases of steel melting procedures and practices, core making, molding, gating and rigging, sand control, heat treating and casting cleaning. Planned production 200 tons per month of mostly pressure type castings weighing 20 to 2000 lbs. Furnish complete work history, references, photograph and salary expectations with first letter. This is a real opportunity for the right man.

BOX 431, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

EXPERIENCED GRAY IRON FOUNDRY SUPERINTENDENT

TO supervise mechanized operation located in Michigan. Must have proven record in production, scrap control, and labor relations. Location, salary and company benefits make this an exceptional opportunity for a man with progressive foundry techniques. State full qualifications with references in first letter. Address: Box 448, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

Gray Iron Foundry located in Southeastern Michigan needs pattern set-up man. Must have gating and risering experience on squeezer patterns. Salary and working conditions good. Address: Box 429, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

WANTED
MECHANICAL OR INDUSTRIAL ENGINEER

Splendid opportunity if interested in methodizing foundry operations; foundry casts steel, malleable and gray iron. Located in Milwaukee area. Please give age and experience.

BOX 432, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY SUPERINTENDENT

Eastern Ohio foundry requires a man with experience in slinger operations and for the production of miscellaneous castings, weight up to two and a half tons. Apply in writing, stating qualifications.

BOX 428, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

COREROOM FOREMAN

Semi-jobbing foundry in midwest wants Coreroom Foreman to tackle tough job involving a multitude of different cores and approximately fifty men. Organizing ability of paramount importance. MEN ONLY—IT'S NO PLACE FOR A BOY!
Submit full particulars, background and salary requested. Replies confidential.

BOX 437, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

STEEL FOUNDRY MOLDING FOREMAN

Must have knowledge of heading and gating, sand mixtures, efficient use of molding machines and sand slingers, in Eastern jobbing foundry producing castings less than 1 lb. up to 2 tons. Address: Box 441, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

PROCESS ENGINEER

Take charge of entire engineering phase of medium-size precision casting foundry. Should have a metallurgical background and experience in induction melting. Location—East. Send full resume.

BOX 439, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

COREROOM FOREMAN

Experienced in green, oil, and resin bonded sand cores, core blower, etc. for a steel foundry producing castings up to 8,000 lbs.
Apply in writing, stating qualifications and salary expected.

BOX 438, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

WANTED

Jobbing molder to act as working foreman in medium-sized brass and aluminum foundry located in Central Illinois. Must have worked on bronze tablets and pressure-type work. Address: Box 410, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

CORE ROOM FOREMAN

Experienced in steel foundry practice. In replying give complete information which will be held in strict confidence by a single executive.

BOX 430, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

SALES ENGINEER

Experienced and having contacts in Sand Blasting Equipment and Dust Arrestor field. Excellent opportunity, compensation open. Old established medium size company, new modern plant. Reply in detail. Information given will be held confidential.

BOX 426, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY SUPERINTENDENT

An excellent opportunity awaits the man who has the experience and qualifications to assume charge of a small foundry employing between 30 and 40 men. A college background desirable but not essential. Modern equipment producing specialty items. Company financially sound with growth potential. In Cleveland area. Write full particulars and resume of background. All replies treated confidentially. Address: Box 433, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Qualified for general nonferrous. Specialty—ornamental plaques, signs, jobbing and limited production. Magnesium experience desirable but not necessary. Exceptional opportunity. State qualifications, salary and willingness to move to Southwest. Address: Box 403, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MOLDING FOREMAN

Wanted for small gray iron squeezer shop, must know gating, sand, cores and would be helpful to know cupola. Small shop, small town, but outlook for steady work good. State qualifications, salary expected, first letter. Address: Box 443, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

SUPERINTENDENT OF MAINTENANCE

Thirty-eight years old, technical schooling. Desire position with mechanized foundry. Experienced in preventive maintenance having reduced costs and increased production. Good labor relations. Twelve years' supervisory experience. Address Box 449, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

EXECUTIVE

Experienced in all phases of foundry operation and management with thorough knowledge of each shop process, engineering, metallurgy, cost estimating and accounting, sales and industrial relations. Technical graduate. Excellent recommendations. Address: Box 366, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SALES REPRESENTATIVE

Technically trained foundryman, with wide experience as chemist, metallurgist, and foundry superintendent, desires sales position in Michigan, Ohio, Indiana area. Six years of foundry material testing and trouble work in automotive foundries. Two years experience as salesman of core binders and foundry facings. Address: Box 419, FOUNDRY, Penton Bldg., Cleveland 13.

PATTERN SUPERVISOR

Canadian, married, age 36. Fully qualified in pattern engineering, estimating or buying. Well versed in ferrous and nonferrous foundry procedures. Will consider position in United States. Address: Box 446, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PATTERN CHECKER OR TROUBLE SHOOTER OR SCRAP ANALYIST AND CUSTOMER CONTACT

Experienced in modern iron and steel foundry methods. Address: Box 383, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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Positions Wanted

MANAGER OR SUPERINTENDENT

Thirty-five years' practical experience in foundry, molder eighteen years. Have been foreman, superintendent and general manager. Did consultation work in various foundries. One was losing $7,000 per month when I started, in seven months it was making good money. Ran three largest foundries in St. Louis, largest one in Chicago. Understand gray iron, semi-steel, brass, aluminum. Know how to rig jobs to get best production at lowest cost. Understand running of cupola mix of various metals; estimating jobs from blueprints. Can give best of references. Available immediately. Address: Box 447, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT OR GENERAL FOREMAN

Desire to make change to more progressive organization. Presently employed in large foundry organization in Southwest. Extensive background in sandslinger methods and operation. Thoroughly experienced in the supervision of all phases of foundry operation. Age, under 40, family man. Seventeen years' experience. Prefer to remain in Southwest, but will consider other locations. Address: Box 434, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOREMAN STEEL FOUNDRY

Young man, 12 years' experience (mostly floor molding), with journeyman's papers. Have specialized in molding departments and desire experience as a foreman. Married, age 30, willing to relocate. Address: Box 391, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT

High frequency induction furnace superintendent seeking position. Fourteen years' experience in production of stainless steel and alloy castings, twelve years as analytical chemist. Certificates in metallurgy. Address: C. GODDARD, 2½ DUKE ST. E., KITCHENER, ONTARIO.

FOREMAN — WOOD PATTERNMAKING OR PURCHASING PATTERNS AND CASTINGS, EXPEDITING AND COORDINATING.

Years of experience in the medium to heavy machine tool industry. Iron and steel foundry background. Address: Box 365, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY EXECUTIVE

Thoroughly experienced in the management of gray iron production or jobbing foundries. Qualified to show you a highly efficient and low cost operation. If you are interested. Address: Box 367, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

COREROOM FOREMAN

Fifteen years' experience as coremaker. Medium and heavy floor work, gray iron and steel. Three years' experience as foreman. Desire job with future. Now taking schooling in supervision. Married, age 35. Addreses: Box 435, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WEIGHT ESTIMATING

Estimating of casting weights furnished by return mail. Accurate, reliable and confidential service. Automatic calculator equipment. Nominal fee. Send blueprints to: CHARLES E. ROLAND, ITASCA, ILLINOIS.

PATTERN SHOP SUPERVISOR

Age 35, ten years' experience, now in charge of three man shop. Familiar with foundry, machine shop practice and casting design. Desire to relocate. Address: Box 442, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CHEMIST

Older man, long experience in ferrous and nonferrous industrial materials. Address: Box 440, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

FOUNDRY METALLURGIST

Twenty years' experience includes electric steel castings, high tensile bronzes, malleable, gray iron and magnesium castings. Developed better methods of melting and control of foundry molding materials. Published papers on quality control methods, foundry sands, and metallurgical topics, gates and risers. Address: Box 436, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Representatives Wanted

SALES REPRESENTATIVE

Large malleable foundry offers permanent sales position to resident of New England on salaried basis. Coverage to include Connecticut, Rhode Island and Massachusetts. Send resume and salary desired.

BOX 411, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

REPRESENTATIVES WANTED

A manufacturer of nationally known foundry equipment has territories available in New England, Western New York and New York City-Newark area. Prefer established company presently handling equipment with engineering-minded personnel.

BOX 397 FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

TOP-NOTCH INDUSTRIAL SALESMAN

National company with network of foundries manufacturing standard shapes of metal castings, both ferrous and nonferrous, has an unusually profitable opportunity to offer an aggressive sales representative with a background of successful selling. Territories open: Chicago, Detroit, Cleveland, Indianapolis, Minneapolis, St. Louis, Pittsburgh. Address: STANDARD FOUNDRY PRODUCTS, 220 WEST 42ND STREET, NEW YORK 36, NEW YORK.

Wanted-To-Buy

Manufacturer of electrical fittings wants to acquire a

NONFERROUS FOUNDRY

with or without other manufacturing facilities. Preferably a modern foundry, with capacity beyond present needs, in a location that permits expansion for general manufacturing and offices. Western Pennsylvania or Midwest preferred.

BOX 425, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

WANTED

One electric furnace transformer 3 phase, 60 cycles, 800 to 1000 KVD, 13200 volts, primary 100 volts secondary.

CRUCIBLE STEEL CASTING COMPANY
2850 S. 20TH STREET
MILWAUKEE 15, WISCONSIN

MACHINERY WANTED

Induction Furnaces, Screens, Simpson Mixers, Riehle Compression Testing Machines, Pulverizers, Grinders, Conveyors. Address: CONDENSER SERVICE & ENGINEERING CO., INC., HOBOKEN, NEW JERSEY, BA 7-0600.

Wanted-To-Buy

WANTED

Used Simpson Portamuller, wired for 220/3/60. Write giving full details, price and where located.

BOX 415, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

WANTED

one 6-ton geared Tea Pot Ladle.

CRUCIBLE STEEL CASTING COMPANY

2850 S. 20th STREET

MILWAUKEE 16, WISCONSIN

WANTED TO BUY

Operating foundry or controlling interest by two qualified foundry engineers. Desire to assume complete control and handle all operations personally. Address: Box 450, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address Box 578, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Capacity Wanted

BARBELL PLATE CASTINGS WANTED

Foundry equipped to quote poundage price on quality castings, painted and delivered. We must meet competitive retail price of 10c per pound. New York area. Address: Box 427, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Foundries For Sale

FOUNDRY—MACHINE SHOP
MARION, OHIO

For Sale: A complete manufacturing unit fully equipped with conventional sand foundry and machine shop, large range of patterns, broaches, and tools for making finish-machined bronze bushings and bearings, particularly for contractors' rolling equipment. 14,000 square feet under roof on 1.9 acres. Available for immediate occupancy. Good will and corporate form available if desired. Equipment list and profit record supplied on request.

MAGNOLIA METAL CO.
18 WEST JERSEY STREET
ELIZABETH 4, NEW JERSEY
EL. 2-7895

FOR SALE OR LEASE

Because of the death of the manager and part owner of the only commercial foundry in South Dakota, it is for sale or lease. For further information contact:

FRED S. BORK
WATERTOWN
SOUTH DAKOTA

FOR SALE

Lack of operating capital forces Pacific northwest manufacturer to sell, lease, or sell control of well established semi-mechanized gray iron foundry. Nominal capacity 100 T per mo. MCD80T. Now producing 55-65T. Additional details available to responsible parties. Address: Box 445, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOR SALE

Half interest in gray iron foundry to man capable of taking complete charge of plant and operation of same. If you don't know gray iron operation from A to Z don't answer this ad. Takes $90,000 cash. Present owner wishes semi-retirement. Address: Box 444, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

For Sale

FOR SALE

Pangborn No. 33 Type LS Blast Cleaning Room and Dust Collecting System, 7 feet 6 inches square and 6 feet 6 inches high.

ALSO

Several No. 20 and No. 22 Walker York Furnaces.

THE WELSBACH CORPORATION
1500 WALNUT STREET
PHILADELPHIA 2, PA.

For Sale

FOR SALE

MOLDING MACHINES
1—Herman, Jolt, Rollover Draw, 6000#, 40" x 60" table.
1—Herman, Jolt Stripper, 48" x 54" table.
2—International, Jolt, Rollover Draw, 24" x 10G, Stationary.
2—International, Jolt, Rollover Draw, 20" x 8-G, Portable.
1—SPO #305 Jolt Stripper.
2—No. 275 Osborn jolt squeezers
1—#610 Johnston & Jennings Air Jolt Rollover Draw Portable 24 x 30 table.
1—Tabor 36 x 50 table Air Jolt Rollover Draw, 3000# capacity.

2—SPO #611B stationary oscillating, jolt, squeeze strippers.
CORE OVENS
1—Coleman Recirculating 3 section with 5 drawers per section. Gas fired.
1—Coleman Recirculating 4 section with 5 drawers per section. Gas fired

BLOWERS FOR CUPOLAS AND FURNACES
1—Connersville Rotary Blower, 3500 CFM.
2—15 HP Spencer-Turbine 2250 CFM at 16 oz.
2—#7½ Roots rotary blowers—27 x 81—14000 CFM.
1—Connersville rotary blower 22 x 66 45 cu. ft. per revolution 9000 CFM.
Maxon-Premix Blowers for Gas ¼ to 1 HP.
2—5 HP 20-oz. Spencer Turbine Blowers.
2—2 HP 20-oz. Spencer Turbine Blowers.

METAL MELTING EQUIPMENT
1—1000# open flame brass melting furnace, gas fired.
1—550# Reda Furnace, nonferrous or iron—oil or gas.
1—Hausfeld Stationary Brass, oil or gas burner, 200# cap.
1—Hausfeld Tilting crucible, gas, 250# Al. Cap.
1—Hausfeld 2000# aluminum capacity furnace, barrel type, open flame, oil fired.

MISCELLANEOUS
1—Pangborn Rotoblast, 14' dia. table with five 5' tables complete.
1—Pangborn 1 to 4 nozzle air blast generator, complete.
1—Sullivan, 2 stage compressor, 14-8¾ x 10, 75 HP.
1—20 HP U. S. Four Speed Snagging Grinder, 24" x 3" wheels.
1—Stoney crane type shakeout.
1—NC-4 Royer sand separator.
1—#1 Demmler core blower.
1—#16 Roto-clone unit complete.
1—36 x 48 tumbling mill.
1—30 x 48 tumbling mill.
Complete stock of rebuilt mill and dust exhaust blowers.

CLIFTON MACHINERY COMPANY
1023 W. SIXTH ST. CINCINNATI 3, OHIO

FURNACES—BARGAIN

2000# Aluminum Fisher Tilting type.
2000# Aluminum Stroman Hydraulic Tilting type.
Dielectric Core Ovens—Model 900A and 1800A Conveyor type—1949; will set up in your shop.
Osborn Core Blowers—Models 91, 94, and 193.
Herman Jar Rollover & Pattern Draw; 1944; 48" x 144"; 10,000# Series.
Int'l. JDP Pattern Draw; 600# Cap. 8" draw.
Int'l. RES Jolt Squeeze Rollover Pattern Draw 35" table.
#275J Osborn Jolt Squeezers.
#601 Osborn Jolt Rollovers.
#2047-4 Osborn Power Rollovers.
Tabor Molding Machines, 30" x 40".
Champion Push Off machines; Model LLA-45 45" x 26" table.
#815 Johnston & Jennings Jolt Rollover Pattern Draw; 30" x 40" table; 15" draw.
#918 Johnston & Jennings Jolt Rollover-Clamp, Leveler, Pattern Draw; 44" x 54" table; 18" draw; automatic take-off—Excellent condition; no pit required—Save $5,000.00.
#2 Climax Wire Straightener.
1000 lb Air Hoists.

BALCHER MACHINERY COMPANY
6020 EUCLID AVENUE
CLEVELAND 3, OHIO
EX 1-8930

FURNACES FOR SALE

Ten used heat treating furnaces and two 7-ton gantry cranes. Good condition, priced to sell. Address: BAER STEEL PRODUCTS, INC., BOX 1428, BOISE, IDAHO.

For Sale

GOOD USED FOUNDRY EQUIPMENT FOR SALE

MAGNETS
15" x 36" CUTLER HAMMER Rectangular
24", 36", 39", 45" Lifting Circular
DINGS Magnetic Pulley, 12" x 20"

OVERHEAD CRANES
SHAW BOX 8000#, 38' Span Overall.
MARIS 5 Ton, 18'-2" Span
NORTHERN 6 Ton, 43' Span, D.C.* (4)
NORTHERN 10 Ton, 43' Span, D.C.* (4)
*Designed for foundry; like new.

COMPRESSORS
SULLIVAN 322 CFM, 125#

MOLDERS
OSBORN Pneumatic Jolt, 5 Ton, 18½" x 25"
MILWAUKEE Jolt Squeeze Stripper, 21" x 27"
TABOR Bench Type, 18" x 26"

CUPOLA BLOWERS, DUST COLLECTORS, MOTORS, STARTERS, ROLLER CONVEYORS

CRANES, MOBILE
MS90 LINK BELT 20 Ton, 60' Boom, On Rubber
KOEHRING 10 Ton, 24' Boom, On Rubber
ORTON Locomotive 25 Ton, 50' Boom, Diesel

SAND EQUIPMENT
JEFFREY Sand Cutter, Portable, Type D, Class 1, Form A, 18" x 24" Screen Opening

SPRUE CUTTER
FERRACUTE ¾" Cap; 5 HP Master

CUPOLA BLOWERS
WHITING 1.24# Pressure, 9800 CFM (2)
ROOTS CONNERSVILLE 16 x 16, & 8 x 16 (2 ea.)
ALLIS CHALMERS 107.5 CFM, 10# Pressure, 7½ HP
ALLIS CHALMERS 894 CFM, 10# Pressure, 60 HP

GRINDERS
SAFETY SPEEDRITE 30" Snag, 30 HP
GARDNER 54" Hor., Disc
GARDNER 77A, 12" Dbl. Opposed Disc
GARDNER 53" Wheel Hor. 20 HP

MISCELLANEOUS
CANTON No. 3 Alligator Shear
WESCO Pneumatic Core Blower, 12" x 27" Table, 6" Lift
SIMPLICITY Shakeout 109" x 43"
COLEMAN Gas Fired Core Oven, 89" x 13' Length x 82½" High ID

WRITE WIRE PHONE

JOSEPH BEHR & SONS, INC.

1156 SEMINARY STREET

ROCKFORD, ILLINOIS

DIAL 2-7721

FOR SALE

1—B & P Swingslinger with 2 ton B & P Plate feeder. Large supply of tips and liners
1—Skip Hoist for #2 Simpson Muller
2—Bristol Recording Thermometers for core ovens, 40°-700° range; 24 hour dials; 20' thermocouple bulbs. 1—never used. 1—used 2 months
1—Jaeger Mobile Crane, solid rubber tires, 5 ton capacity, 18' telescopic boom.

MEECH FOUNDRY, INC.
9906 MEECH AVENUE
CLEVELAND 5, OHIO
MICHIGAN 1-5550

FOR SALE
SHOT BLAST EQUIPMENT

American Wheelabrator Tumblast, 48" x 42", serial number A-13853. Motors 440-60-3.

CLARK EQUIPMENT CO.
BUCHANAN, MICHIGAN

FOR SALE
DETROIT ELECTRIC FURNACE

Type AA of 1,200 lb cold metal or 2,600 lb hot metal capacity, complete with mechanical and electrical equipment for melting and rocking, including oil filled transformer of 11,000 v. primary and 125 v. secondary. Presently crated but available for inspection on 48 hours notice. Ideal for high test cast irons, brasses or bronzes. Price: $9,500.00. Address: HOPE ELECTRICAL PRODUCTS CO., 338 WILSON AVENUE, NEWARK 5, N. J.

America's Largest Stock of Electric Melting Furnaces!

1—Swindell Top Charge 9′ dia. shell Duplexing Furnace, 1500 KVA transformers with taps for 11,000 or 13,200 volts. New 1944, used very little. Top charge for regular heats or may be charged through trunnion for ladle or cupola metal. Amplidyne controls. May be seen in place near Chicago. (If you want a larger transformer we have 2500 KVA, 11,000 or 13,800 volts.)

1—Whiting Hydro Arc 8 MT Top Charge, 5600# per hour rate of melt, 8900# capacity of well, 8″ electrodes. Furnace new 1952. 2000 KVA transformer, 12,000 volts. Complete with American Air Filter, smoke hood and Whiting Bag Type Dust and Smoke Suppressor. May be seen in place Chicago.

1—Chicago 3000# Electric Furnace, tilt back head. 4″ electrodes, 800 KVA, 12,000 V transformer. Complete. May be seen in place Chicago.

1—Swindell Type 6 ton 9′ diameter Shell Electric Furnace, 2500 KVA transformer, 13,800 or 11,000 V. In our Chicago warehouse.

Lectromelt 1 ton Side Charge with 800 KVA, 12,000 V transformer. Late type unit. Complete. Now in our Chicago warehouse.

Lectromelt 500# Side Charge Type T, 300-375 KVA transformer, 2300 V primary, Moore controls, G. E. circuit breaker. Late type. Now in our Chicago warehouse.

Transformers—2—2500 KVA furnace transformers, 11,000 or 13,800 primary voltage.

1—Detroit Electric, 1500# capacity, 13,200 primary voltage. Kuhlman transformers. Complete with controls.

Detroit Electric 350#, Type LFA with Kuhlman transformers and oil circuit breaker, 13,200 primary voltage.

Detroit Electric with 350# and 1000# tapered shells, 2300 V Kuhlman Transformer. Complete with panelboard and bus bars.

ACME EQUIPMENT CO., INC.

126 South Clinton Street, Chicago 6, Illinois
Phone: ANdover 3-3430

FOR SALE
FOUNDRY EQUIPMENT

We offer subject to prior sale the following foundry equipment:

1—Worthington type YC two stage Air Compressor 515 CFM 100 HP 220/440 V—3 Phase 60 Cycle (New 1952)
1—Ingersoll Rand Single Stage Air Compressor 210 CFM 50 HP 220 V—3 Phase 60 Cycle
1—American Wheelabrator 42″ x 48″ Serial A82050 with mechanical loader (New 1951)
1—American Wheelabrator 27″ x 36″ Serial A36126 with mechanical loader
1—Hollingsworth Wheelabrator 27″ x 36″ with loader
1—Hollingsworth Wheelabrator 27″ x 36″ (No loader) New 1953
1—Pangborn shot blast machine
1—Beardsley-Piper sand slinger Serial 200139295
4—Stand Grinders 5-10-25 HP (All late models)
2—International Roll over machines
2—Osborn 710-J squeezer machines
4—Tabor squeezer machines
10—SPO molding machines
Ladles, flasks, jackets, tram-rail and other foundry items.
All equipment may be inspected at our foundry location.

WRITE WIRE PHONE

LYNCH CORPORATION
CRYSTAL AT AMES
PHONE 2-0261
ANDERSON, INDIANA

FOR SALE

21—"V" Type foundry dump carts, 1 yd. cap. on wheels ..... $50.00 ea.

2—No. American Blowers, 1300 CFM, 16 press. oz. 7″ sq. open, 10 HP, AC, 220/440, 3480 RPM late models .....$350.00 ea.

1—75 HP, AC motor, 690 RPM....$275.00

1—4000# cap. Clark Electric Fork Lift with battery and charger..$1250.00

1—3 ton cap. Whiting scrap charging crane ..... cheap

JOCELYN IRON & STEEL CORP.
2847 SOUTH KEDZIE AVENUE
CHICAGO 23, ILLINOIS

FOR SALE
TURBO BLOWERS WITH MOTORS

CFM	PRESS.	MAKE	CFM	PRESS.	MAKE
6000	32 oz.	Ing.-Rand	660	20 oz.	A-B
4700	32 oz.	Ing.-Rand	500	10 oz.	No. Am.
4050	16 oz.	No. Am.	340	20 oz.	A-B
3500	40 oz.	Spencer	320	12 oz.	Spencer
2800	1 oz.	Spencer	180	15 oz.	Spencer
2700	16 oz.	Spencer	9000	6″ SP	Northern
2500	7 oz.	Sturt.	5310	10″ SP	N.Y.
2000	2½ oz.	Spencer	3420	8″ SP	N.Y.
2000	1 oz.	Spencer	2500	½″ SP	American
1150	20 oz.	No. Am.	2344	2″ SP	Clarage
675	16 oz.	No. Am.	1100	4½″ SP	Bayley

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVE.
CLEVELAND 14, OHIO

FOR SALE

2—Used Perkins belt-driven, 10½″ throat sprue cutters

1—Used No. 2 Bridgeport belt-driven, floor type, ball bearing grinder with counter shaft.

THE IMPERIAL BRASS MFG. CO.
1200 WEST HARRISON STREET
CHICAGO 7, ILLINOIS

FOR SALE

SHALCO Shell Molding Machine Model CO-1, 220 volts, 3 phase 60 cycle. Purchased new, never used. Price f.o.b. Canton $1,995.00

FRANTZ MANUFACTURING CO.
1200 CAMDEN AVE., S.W.
CANTON 6, OHIO

FOR SALE

CUPOLA FURNACE—48″ Dia. x 30″ high—2 ton capacity, good condition, recently relined, complete with #6 Sturtevant blower, 20 HP motor and V-belt drive, extra firebrick. LADLE—36″ side geared, hand wheel operated, 2 ton capacity, with crane yoke—used 7 times.

DOVER CHEMICAL CORPORATION
DOVER, OHIO
PHONE: 64622

FOR SALE
OSBORN MOLDING MACHINES

4	275J Jolt Squeeze molding Machines	$225.00 ea.
1	559 Jolt Stripper Portable	750.00
1	559HD Jolt Stripper Stationary	750.00
1	561 Jolt Stripper	3250.00
1	714PJ Jolt Squeeze Stripper	1500.00
5	720 Jolt Squeeze Strippers	1500.00 ea.
1	721 Jolt Squeeze Stripper	1600.00
2	814P Jolt Squeeze Strippers	1250.00 ea.
4	601 Jolt Rollover & Pattern Draw	450.00 ea.
2	602 Jolt Rollover & Pattern Draw	600.00 ea.
6	2047-4 Jolt Rollover & Pattern Draw	650.00 ea.
2	405-95 Jolt Rollover & Pattern Draw	4500.00 ea.

THE MASTER FOUNDRY CO., INC.
15019 SARANAC RD.
CLEVELAND 10, OHIO

FOR SALE

1—Tinius Olsen 100,000# Universal Compression Testing Machine
1—Magnaflux Demagnetizing Unit
Simpson Sand Mixers 18″ dia. Laboratory #0, #1, #1½, #2, #3.
Miscellaneous: Screens, Pulverizers, Grinders, Conveyors—all types, Tyler Rotap Screens, etc.
OUR 38th YEAR

CONSOLIDATED PRODUCTS CO., INC.
66 BLOOMFIELD STREET
HOBOKEN, NEW JERSEY
HO 3-4425 N.Y. TEL. BA 7-0600

FOR SALE

Surplus Pangborn Sandblast Parts, as listed below; in excellent condition. Will sell at ⅓ price. Only a few additional parts would have to be purchased to make complete unit:

1—Serial IC3-51145 Elevator
1—Serial IC3-51150 Elevator
1—Serial BVR7-51287 Abrasive Separator
1—Serial BVR7-51288 Abrasive Separator
1—Serial 1AU11-5211 Abrasive Tank
1—Serial 1AU11-523 Abrasive Tank
1—Type CH2 Dust Collector
1—Sturtevant Silentvane Fan Blower; Size 70; Design 10; Style W-55570; Pangborn Serial 14K02-515.

THUNDER BAY MANUFACTURING CORP.
ALPENA, MICHIGAN

The AAA trademark is your assurance of the Finest in Factory REBUILT Equipment. BUY NOW with Complete Confidence. NO RISK INVOLVED. Ask about our NEW SALES POLICY.

AAA MACHINERY & EQUIPMENT CO.

15539 SARANAC ROAD — CLEVELAND 10, OHIO

PHONE: LIBERTY 1-6545

AIR & ELECTRIC HOISTS

2—**INGERSOLL-RAND** Size C, 2000 lbs.
7—**INGERSOLL-RAND** Size D, 4000 lbs.
1—**INGERSOLL-RAND** Size DR, 2000 lbs.
2—**INGERSOLL-RAND** Size E, 10,000 lbs.
2—**INGERSOLL-RAND** Size D-6, 6000 lbs.
1—**CHICAGO-PNEUMATIC** Model A, 1000#.
1—**ELECTRO-LIFT** 3000 lbs capacity, low head room, cable type, 4 Hp motor.
4—**AMERICAN** Engineering Type A1, 2000 lbs cap. 220/3/60 cycle, for tramrail.
1—**DETROIT** 5 ton cap. Model LHR, 440 volt Ser. #19317E 1953 unit.
2—**WRIGHT** electric 6 ton capacity, low head-room. (Never used)

BUCKET ELEVATOR

1—**JEFFREY** 50′ centers of drive pulleys, 106′ belting 13″, with continuous type buckets, Jones Reducer, motor etc.

CUPOLA CHARGER

1—**WHITING** 3 Ton Tiger Monorail, type 2 motor wishbone charger, cab operated, with controls, 5 buckets etc. 80′ tram beam track & conductor. Buckets 48″ x 52″ w/super structure. Late unit.

CORE BLOWERS

3—**OSBORN** No.'s 91 & 92, with air clamps.
2—**REDFORD** No. 1, Cartridge Bench Type.
1—**DEMMLER** No. 1 with Air Clamps.
1—**DEMMLER** No. 3K with air clamps, cores to 25 lbs cap. 1953 unit.
2—**CHAMPION** No. CB-400, weight of core to 300 lbs, draw 6½″.

CUT-OFF SAWS & MACHINES

2—**TESSEMER** Model H, Sprue Cutter ¾″ cap. brass, with 3 HP motor.
2—**CLIMAX** #2A Wire Straighteners, 4 Sizes 1/16″ to ¼″ with 1 HP V-belt.

CONVEYORS—ROLLER-APRON-BELT

1000′—**MATHEWS** Gravity Roller, 10″ wide 2½″ roller dia. 4″ centers.
1200′—Gravity Roller 16″ wide—2¾″ diam. 4″ centers, above rail.
200′—**MATHEWS** Gravity Roller 18″ wide—2¾″ diam. 4″ centers, above rail.
1—**FARQUHAR** 18″ x 35′ Model 334-3, portable trough with 5 HP motor and elect.
1—**FARQUHAR** 18″ x 19′ Model 341 Undercar unloader, rubber belt, 5 HP motor.
1—**LINK-BELT** Steel Apron 18″ x 24′.
125′—**LOUDEN** Monorail, complete with four 20′ bridges and all accessories.
300′—**STANDARD** Gravity Roller 24″ wide, 3½″ diam. on 6″ centers, 6″ channel.

CUPOLA & FURNACE BLOWERS

1—**GE** Centrifugal Type FS3670-9400 Serial #27006, w/motor 100 HP, 3600 RPM.
1—**BUFFALO FORGE** No. 7-E, 25 HP-32 oz. 1600 CFM, 28″ wheel.
9—Furnace Blowers 1-5-7½ HP-16 oz.

ELECTRIC FURNACES

3—**DETROIT** Type AA, Rocking, 1500 to 2000 lbs cold charge, w/400 KVA transformers 4650 primary volts, single phase.
2—**DETROIT** Type AA, Rocking, 750 to 1000 lbs cold charge, w/250 KVA transformers, 4650 primary volts, single phase.
1—**PITTSBURGH-MOORE** Electro-Melt Furnace Model CQ, 4000 lbs capacity, less transformer & switch gear, 1939 unit.

GAS & OIL FIRED FURNACES

2—**LINDBERG-FISHER** Model MNP, size 2400, gas or oil fired, w/motors-blowers, NEW pots, electrical tilting mechanisms.
5—**LINDBERG-FISHER** #400 Crucible, Type BBI, hand tilting, gas or oil fired, with motors-blowers, 1950 units.
1—**STROMAN** #600, Model U Tilting Reverberatory, gas or oil fired, w/motor-blower, 1949 unit.
2—**STANDARD** #30-#150 Crucible, Stationary gas or oil fired, w/motor-blower.

GRINDING EQUIPMENT

2—**FOX** No. 5 High Speed Stand Grinders, wheel size 24″ x 3″ w/10 HP motor.
1—**FOX** No. 7 High Speed Stand Grinder, wheel size 30″ x 3″, w/15 HP motor.
2—**HAMMOND** WR-1 Double End Snagging 7½ HP—wheel size 20″ x 3″ x 10″.
1—**HAMMOND** WR-1 Double End Snagging 10 HP—wheel size 24″ x 3″ x 10″.
1—**STANDARD** #30 Double End Multi-Speed Model 101—10 HP—wheel 24″ x 3″.
1—**U. S.** Double End Snag. Model 65, 20 HP-4 speed unit, wheel 24″ x 3″.
1—**MARSCHKE** Swing Frame, 3 HP-220/440.
3—**MARSCHKE** Swing Frame 15 HP 2 speed unit, wheel size 24″ x 3″ x 12″.
3—**MARSCHKE** Swing Frame 20 HP—3 speed units, wheel size 24″ x 3″ x 12″.
1—**QUEEN CITY** Model 100 Double End Disc, 10 HP motor, wheel 20″ x 2″ x 2″.
1—**U. S.** Electric Swing Frame, 15 HP, 2 speed unit, wheel size 24″ x 3″ x 12″.

LADLES & POURING DEVICES

10—**WHITING** Riveted Crane Ladles, taper side with V-bail (E-Z Pour) enclosed gearings nose pouring, ½-1-2 ton.
6—**MODERN** 1500# Cylindrical Geared, with crane bails & floor stands, NEW covers, 30″ dia x 29″ length.
2—**MODERN** Mixing Ladles, on trunnions, geared, covered & lined, 40″ dia. x 60″ length, with preheaters.
6—**INDUSTRIAL,** Lip pour, 24″ diam, x 24″ H, 1600 lbs cap. Enclosed Timken gear.
12—**WHITING** Models 1000 & 2000 Pouring Device w/500# ladles, hand tilt devices.
6—**MODERN** Models F-FA-FA-9 & F-9 Pouring Devices with 500 Lb. covered ladles, trolley, & hand Tilt devices.

HEAT TREAT FURNACES

1—**INDUSTRIAL** Heat Treat Furnace, preheat gas fired, heavy duty, 5′ x 7′6″ x 8′ H., complete with Air Heater, 3 HP motor and controls.
1—**INDUSTRIAL** Heat Treat Furnace, gas fired, continuous conveyor type, 8′ W. x 16″ H. x 45′ L., chamber complete with slat conveyor.
1—**INDUSTRIAL** Heat Treat Furnace, gas fired, car type, 14′6″ L. x 6′6″ W., complete with heater, run-out car, electric door hoist and controls.
5—**LINDBERG - FISHER** Heat Treat Furnace, gas fired, Model 4860-GH, Cyclone type with working chamber 48″ diameter x 60″ deep, comp. with burners & controls.
1—**INDUSTRIAL** Heat Treat Furnace, gas fired, Circ-air car type, 14′6″ L. x 6′6″ W., complete with heater, blower, electric door hoist and controls.
1—**LEEDS & NORTHROP** Heat Treat Furnace, Homo Electric tempering, 75 KW, vertical type with work chamber 36″ diam. x 48″ high, complete with controls.
1—**ELECTRIC FURNACE CO.** Heat Treat Furnace, electric 250 KW, car type, 6′ x 6′ x 14′, complete with controls.

MOLD CONVEYOR

1—**PALMER** "B" w/no. HD-12 speed reducer & Reeves variable drive 4-1 ratio, 200′ straight track, 7-3′ sections 90° curves 1-6′ section; 2-1′ section 30° curves, car size 18″ x 42″, 80 cars.

MOLDING MACHINES

1—**DAVENPORT** #28SA Jolt Rollover & Pattern Draw 30″ x 40″ table, 12″ draw, 1500 lbs cap.
2—**INTERNATIONAL** RES Jolt Squeeze Rollover Draw Size 15″ x 8″ draw, flask cap. 24″ x 42″ O.D.
1—**INTERNATIONAL** PKL Jolt Squeeze Air Pin Lift 18″ x 24″ table, 5½″ draw.
2—**INTERNATIONAL** G Jolt Rollover Foot Draw 18″ x 56″ table, 8″ draw, (other 20″ x 8″).
1—**INTERNATIONAL** LP-10 pin lift machine.
1—**MILWAUKEE** #1030 Jolt Pin Lift, 28″ x 34″ table, 12″ draw, 1000 lbs cap.
2—**MILWAUKEE** No. 124-6 Jolt Squeeze, 17″ x 26″ table, 12″ cylinder. Portable.
3—**OSBORN** No. 559 Portable Jolt Strippers 25″ x 30″ table, 1200 lbs jolt.
2—**OSBORN** No. 601 Jolt Rollover Pattern Draw, 600 lbs cap. overall flask 30″.
6—**OSBORN** No. 275 J, Jolt Squeezers.
2—**OSBORN** No. 142 Jolt Rollover Foot Draw 14½″ x 24″ table, 8″ draw, 350#.
2—**OSBORN** No. 710J Jolt Squeeze Pin Lift 16″ x 25″ table, 6″ draw, 10″ squeeze cyl.
2—**OSBORN** No. 712PJ Jolt Squeeze Pin Lift 18″ x 28″ table, 6″ draw, 12″ squeeze cyl.
2—**HERMAN** 40″ x 60″—13″ Diam. Cyl. Heavy Duty Bumper Plain Jolt Machine.
1—**JOHNSTON & JENNINGS** No. 918-B Jolt Rollover Pattern Draw, 44″ x 54″ table, 18″ draw 3000 lbs capacity.
2—**JOHNSTON & JENNINGS** No. 815-B Jolt Rollover Pattern Draw, 30″ x 40″ table, 15″ draw, 1500 lbs cap. air operated head.
1—**TABOR** 22″ Shockless Jar, Rollover & Pattern Draw, 22″ x 42″ table, 10″ draw 600 lbs cap. portable.
2—**TABOR** 30″ Shockless Jar Rollover & Pattern Draw, 30″ x 40″ table, 12″ draw 1000 lbs. cap. Portable or Stationary.
3—**SPO** No. 506 Jolt Rock-Over Pattern Draw Machines, 24″ x 25″ table, 10″ draw, 600 lbs cap Portable or Stationary.
2—**SPO** No. 507 Jolt Rock-Over Pattern Draw 32″ x 40″ table, variable draw 10″ to 20″, 1500 lbs cap. 1948 models.
1—**SPO** No. 508 Jolt Rock-Over Pattern Draw Machine, 28″ x 30″ table, draw 9″ cap. 1200 lbs. Jolt cap.
1—**SPO** No. 413-D Jolt Squeeze Power Rock-Over Pattern Draw 24″ x 25″ table, 10″ draw, 600 lb cap. max. flask 26″ x 36″.
1—**SPO** No. 213-D Jolt Squeeze Strip Machine table 19″ x 28″, 8″ draw, 800 lbs.
7—**SPO** No. 110J Jolt Squeezers, Portable.

SAND MULLERS

1—**BEARDSLEY & PIPER** No. 60 Speed Muller, Model G, 10 cubic ft. batch size, with 50 HP motor and all electrical.
1—**BEARDSLEY & PIPER** No. 30 Speed Muller 3 cubic ft. batch size, with motor & electrical, serial No. 30-2.
3—**SIMPSON** #2 style UD, unit drive type, 6′ pan diameter, 1500# batch size, with skip hoist loader, dust hood, etc.
1—**SIMPSON** No. 1½ style UD, unit drive type, 4′ 6″ pan diam. 700 lbs batch size, with 7½ HP Master Unit Drive, skip hoist, loader, dust hood, water meter, etc.
5—**SIMPSON** No. 3, Style C, Separate Drive 8′ pan diam. 3000 lbs batch, 40 HP motor & Falk Reducers, serial No.'s in 58,000's, 1946 units. Gear enclosed.
1—**BAKER PERKINS** #5A continuous muller, 100 to 120 tons per hour.
1—**BESSER** Paddle mixer, 36″ x 42″ horizontal drum, 12 cu. ft. cap. w/7½ HP motor and v-belt drive.

SAND BLASTING EQUIPMENT

1—**AMERICAN WHEELABRATOR** 66″ Diameter Swing Table, w/shot return.
1—**PANGBORN** No. GK-2 Roto-Blast Barrel w/bucket loader etc. 7 cubic feet cap., drum size 30″ x 38″, airless type, 1943.
2—**PANGBORN** EP-5 Shot Blast Cabinet 5′ x 4′ x 7′ shot return, pressure tank.
1—**PANGBORN** Shot Blast Room, 10′ x 10′ x 12′ walk-in type, with pressure tank, nozzles, hoses, elevator etc.
1—**PANGBORN** Roto-Blast Table 6′ Diam. with 6-20″ tables, Model LG.

SAND PREPARATORS

8—**BEARDSLEY & PIPER** Models "S"-"M" Screenerators, portable units.
1—**BEARDSLEY & PIPER** #70 Portable Sand Preparators with magnetic separator, 90 cu. ft. hopper, gyrating screen, aerator, 1946 unit, ser. #SC-73.
1—**AMERICAN** Sand Cutter Model AM, size 69/45—serial #176—motors enclosed.
1—**AMERICAN** Sand Cutter Model BD, size 75/60—serial #722—motors enclosed.
2—**ROYER** Model C-2 Portable Sand Conditioners, 25 to 30 tons per hour cap.

SHAKEOUTS

1—**ROYER** Shakeout & Sand Conditioning Unit, Serial No. ST-47.
1—**SIMPLICITY** 4′ x 6′ Model B Serial No. 46-SOB-145, 5000 lbs cap.
1—**SIMPLICITY** 2′ x 3′ Gyrating Sand Screen—single deck—Model CA—Motorized.
1—**SIMPLICITY** 4′ x 10′ model D with automatic crusher, 15,000 lbs. capacity.
1—**STONEY** core knockout machine.

SAND SLINGERS

1—**B & P** Tractor Type 13′ arm 4″ liner & cups, 19″ head, w/spare head 22″-5″ liner & cups—25 HP.
1—**B & P** Tractor Type 13′ w/magnetic tower, 16″ head, 4′ ramming, 4″ tip, 1946.

TUMBLING BARRELS

5—**SLY** 36″ x 60″ with 5 HP Gearhead motor & drive—built-in magnetic brake.
2—**SLY** 42″ x 72″ Square 10 HP Gearhead motor & drive—built-in magnetic brake.
2—**SLY** 24″ x 36″ w/motor and drive.
1—**SLY** 42″ x 66″, Type C, 10 HP gearhead motor drive—built-in magnetic brake.
1—**NEW HAVEN** Air Blast Barrel 42″ x 48″ with motor & drive etc. 1942 unit.
1—**MCLEOD** Type "S" sand blast barrel, 30″ x 30″, motorized.

FOR SALE

AIR COMPRESSORS

Ingersoll Rand Type 10—14 x 9 x 12, 2 stage, 75 HP, 3/60/220/1200 rpm synchronous motor, 350 CFM at 100#.

5 x 5 Ingersoll Rand 10 HP motor.

Ingersoll Rand Type 10, 800 CFM, XRB2, 16" stroke 20" x 12½" cylinder, 2 stage compressor, 206 HP, 220 volt motor, with starter and air receiver. Complete. This unit was rebuilt in 1952 by Earl Knox Co.

Ingersoll Rand Type 10, 800 CFM, 2 stage air compressor, 200 HP, 220 V motor. This is an older unit. No starter or air receiver. Overhauled in 1951.

Sullivan Vertical Single Stage 100 HP air compressor, 220 volt motor, with starter and air receiver.

BLOWERS

Spencer Turbo Blower, 2250 CFM at 16 oz. 15 HP 3/60/220 totally enclosed motor. New 1947.

Ingersoll Rand Motor Blower Type FS. Single Stage 4000 CFM @ 3.75 PSI, 100 HP, 220 V. G.E. Induction Motor.

Buffalo 7E Direct Connected Blower, 50 HP Westinghouse motor, 3/60/220-440 V, 3535 rpm, 28" wheel, 3500-4000 CFM at 32 oz. Flanged outlet.

General Electric 7500 CFM, 20 oz., 89.6 Max HP, 220 V motor. Airway controls.

CONVERTER

100 KW Rotary Westinghouse 220 V 60 cycle primary 250 V DC, complete with controller and panel.

CORE BLOWERS

International SB 13.
Federal Sandblo CB40B, like new.
Demmler #50.
Peterson Core Blower (Similar to Demmler #50).

CRANE LADLES, GEARED

1—42" x 47" Crane Ladle.
2—44" x 44" Crane Ladles.

CRANES

5 Ton P & H Overhead Elec. Traveling Crane 30'6" span, 15' lift (can be increased) 3 motor, 220 V A.C. New 1946.

CRUSHERS—PULVERIZERS

1—Stedman 15" x 12" Type A. With 10 HP 220-440 V motor.

DUST COLLECTORS

Whiting Dust Suppressor, bag type, 12,000 CFM, 30 HP motor to handle hot fumes from electric furnace hood. New 1953. Cost us over $14,000 before erection and without wiring or duct work.

GRINDERS, DISC

Besley 208 Double End 26" x 2⅜" wheel with 2 compound tables, V belt drive, 15 HP, 220-440 totally enclosed motor, magnetic starter controls.

2—U. S. Model 80 Double End 2-18" dia. wheels, 7½ HP motor, 2 swinging tables 8" x 14"—1 with hand lever feed.

GRINDERS, SNAGGING

McCabe 2" x 24" wheels, 48" between wheels, 3/60/440 V.

1—Hammond type 20 WR2—3" x 24" wheel, double end grinder, single speed, 20 HP Louis Allis Squirrel Cage, 220-440 V—1760 rpm motor.

1—U. S. DE, Model 65, 3" x 24" wheels, variable speed, 20 HP motor.

Hisey Wolf adjustable speed 15 HP 30" x 3" wheels, 220/440 V motor.

Kling Bros. 30" Double End Snag Grinder, heavy duty, 15 HP motor.

Kling Bros. 18" Double End Snag Grinder, heavy duty.

GRINDERS, SWING

2—Fox 10 HP 3/60/220-440 V. Swing Frame.
U. S. 15 HP, 3/60/440 V Swing Frame, 2 speed.
Fox 15 HP Swing Frame, 2 speed.
Marschke 20 HP, 2 speed.

HOISTS

1000# Cleveland 220/440 V.
1000# Detroit 220/440 V.
5—1000# P & H Hevi Duty with trolley.
2—2000# P & H Hevi Duty with trolley.
11—4000# P & H Hevi Duty with trolley.
2—4000# P & H Hevi Duty with trolley and powered drive unit for moving hot metal.

LADLES

1 Ton Enclosed Gear Crane Ladle truck type 4 wheel car for 18" gage track, Whiting Junior.

MOLDING MACHINES

2—Champion Pin Pushoffs, 38" x 40"—12" draw.
1—Johnston & Jennings 1015 Jolt Pin Lift, 30" x 38" table.
1—Champion Hand ram, hand clamp, hand rollover 26" x 14" table.
1—Champion Hand Ram, Hand rollover, Hand draw core machines, 15 x 15 bed.
3—Davenport Portable Jolt Rollover Pattern Draw 20" x 24" tables, open end, 8" draw.
1—International Type G 24 x 10 Jolt Rollover, foot draw, 22" x 30" table, 10" draw.
1—Herman Molding Machine Jolt Rollover Pattern Draw, 20 x 30.
1—Herman Molding Machine Jolt Rollover Pattern Draw, 20 x 36.
1—International Type G 30 x 12 Jolt Rollover Foot Draw, 28" x 36" table, 12" draw.
1—International Type G 30" x 30" table, 9" draw, Portable.
2—International Type G 18" x 56" table, 8" draw. Portable.
1—International Type F Jolt Rollover 27 x 12, 12" draw, 35" x 26" table.
1—International Jolt Rollover Pattern 10" Draw, 22" x 30" plate, 6" jolt cylinder.
1—International Plain Jolt Molding Machine 48" x 60" table, no pit required.
1—Herman Jolt Rollover Pattern draw, 40" x 84" table, slotted nickel alloy table over regular table to accommodate various sized flasks, air clamp, new 1946. Used very little.
1—Herman 20" x 30" rollover pattern draw, 750# series. Air clamp.
2—Herman 20" x 24" Jolt Rollover Pattern Draw, 750# series. Air clamp.
1—Herman 4000# Series High Speed Rollover 30" x 60" with 32" x 48" bumper, 13" cylinder pattern device.
2—Milwaukee Arm Type Jolt Squeeze Strippers, 1500# capacity, Model 163-50 Serial 13104-5, 15" x 24" table, 16" x open end, pattern size. Late type.
1—Osborn 76J Portable Jolt Squeeze Molding Machine 12" cylinder.
2—Osborn 405 Jolt Rollover 40" x 70", 2000# capacity, 20" x 60" jolt table and 4 wheel receiving car.
1—Tabor 1000# Rollover, 30" x 60" table.
4—Spo 214 Jolt Squeeze Pin Lifts.
Herman 6000# capacity Jolt Rollover Draw. 50" x 74" table. New 1948.
Milwaukee 2542 Jolt Pin Lift used as companion to the above Davenport. 38" x 42" table. Serial 14805.

MULLERS AND MIXERS

Simpsin #2 Motor on base.
Simpson #3 Motor on base.
Simpson #3 Type H open gear type.
Simpson #3 Open Gear Type. $1000.00.
Simpson #3 Muller with bucket loader.
American Model M Sand Cutter, 70" blades.
Royer NDP 47 14" Belt, 4 rubber tires.
B & P #60 with skip loader.
B & P Speedmuller 80 w/cooling blower.

PREPARATOR

B & P #70 Preparator. Only used 3 months.

RIDDLES

Champion Sand Riddle, floor type.
Universal Sand Riddle.

ROTOBLAST

Pangborn, table with 3-8" rotating work tables, 3 position loading, cleaning and touch-up designed for work similar in size to aircraft cylinders. Like New condition.

SAND HANDLING EQUIPMENT

Blaw Knox Sand Grab Bucket for crane use.

SHAKEOUTS

2—4' x 6' Simplicity.
1—4' x 6' Simplicity, 15,000# capacity.

SPEED REDUCERS

We have a large stock of speed reducers and geared head motors. Write us your needs.

TUMBLING BARRELS

2—Sly 42" x 48" dia. barrels, master geared head motor drives.

WHEELABRATORS

1—American Wheelabrator 48" x 48" with loader, 220/440 V motors.
1—American Wheelabrator 36" x 42" with loader, 220/440 V motors.

WIRE STRAIGHTENERS

2—Climax 1 HP motor.

FLASKS

Hines Popoff and Jackets
1st Figure is Depth of Cope
2nd Depth of Drag

1—10" x 17" flask 4/3
1—10" x 18" flask 5/4
1—11" x 16" flask 5/4 1/2
1—11" x 22" flask 5/4
1—12" x 12" flask 5/3 1/2
1—12" x 16" flask 5/7
2—12" x 16" flasks 6/5
1—12" x 16" flask 7/5
1—12" x 16" flask 7/7
1—12" x 16" Extra 4½" drag
13—12" x 16" C.I. Jackets
1—12" x 18" flask 5/4
2—12" x 18" flasks 6/6
1—12" x 18" flask 7/7
1—12" x 18" extra drag 5"
1—12" x 18" extra drag 7"
11—12" x 18" C.I. Jackets
1—12" x 20" flask 5/5
1—12" x 20" flask 5/7
2—12" x 20" flasks 7/5
1—12" x 20" extra 5" drag
8—12" x 20" C.I. Jackets
2—12" x 22" flasks 5/5
8—12" x 22" C.I. Jackets
1—12" x 26" flask 5/5
11—12" x 26" C.I. Jackets
1—12" x 30" flask 5/5
11—12" x 30" C.I. Jackets
1—14" x 28" flask 6/6
1—15" x 18" flask 5/3 1/2
1—16" x 21" flask 6/5
1—17" x 17" flask 6/5
1—18" x 26" flask 5/5
8—18" x 26" C.I. Jackets
1—19" x 19" flask 5/4
2—20" x 20" flasks 6/6
7—20" x 20" C.I. Jackets
2—24" x 24" flask 8/8
1—24" x 24" 3" drag upset
1—24" x 24" extra 6" cope upset
8—24" x 24" C.I. Jackets
1—24" x 28" flask 6/6 1/2
2—34" x 34" flasks
10—34" x 34" C.I. Jackets

ACME EQUIPMENT CO., INC.

WE WILL BUY FOR CASH A SINGLE PIECE OF EQUIPMENT OR YOUR ENTIRE FOUNDRY

126 South Clinton Street Phone: Andover 3-3430 Chicago 6, Illinois

MONEY SAVING VALUE • NEW MACHINE PERFORMANCE • IMMEDIATE DELIVERY

BACKED BY UNIVERSAL'S GUARANTEE OF SATISFACTION OR FULL PRICE REFUND

AIR COMPRESSORS

1—40 HP SULLIVAN, Model B-Bim #8, WL 60 w/Receiver.
1—25 HP INGERSOLL-RAND, slow speed, horiz. ER-1, 9 x 18.

BLOWERS

1—85 HP G.E. Cupola Blower, 24 oz.
1—40 HP SPENCER, 3600 CFM, 24 oz.
3—7½ HP FISHER, 16 oz.
15—CENTRIFUGAL BLOWERS, 350 CFM to 10,500 CFM.

CLEANING EQUIPMENT

1—SLY BLAST ROOM, 8' x 10' x 7½' w/Dust Collector.
1—AMERICAN #1 MULTITABLE, 6 aux. tables 15", main table 45".
1—PANGBORN ROTOBLAST, Airless, #14 Barrel, 48" x 36".
1—AMERICAN WHEELABRATOR, 42" x 48" TUMBLAST w/skip charger.
1—ROBBINS SHAKEOUT, 4' x 2'.
1—AMERICAN #2 MULTITABLE, 5 tables, 37" dia.
2—SIMPLICITY SHAKEOUTS, 4' x 8'.
1—LINK BELT SHAKEOUT, 5' x 8', 5 HP Motor.
2—TUMBLING BARRELS, Cast Iron, 36" x 24" w/2 HP Motor.
2—TUMBLING BARRELS, Square, 34" x 48".
2—TUMBLING BARRELS, Side Tilt, 18" wide x 20" deep.

CONVEYORS

1—HEWITT-ROBINS, Shaker Type, vibrating, 100' long.
1—JEFFREY, 28' long, 20" belt, troughing idlers.
1—LINK-BELT, 50' long, 19" rubber belt, w/drive.
1—APRON FEED, 10'7" centers, w/drive.
1—STEEL PLATE MOLD, 90' centers, 30" belt, w/drive.
2—STEEL PLATE MOLD, 90' centers, 24" belt, w/drive.
6—SAND BELT CONVEYORS, 10' centers to 140' centers, 18" to 36" belt, complete w/drives and hoppers.
2—CASTING CONVEYORS, wire mesh, 18" x 32" w/drive.
FOUNDRY TYPE ROLLER CONVEYOR—ALL SIZES—SEND REQUIREMENTS

CUPOLAS

1—WHITING, #4, with skip charger, motor and blower.
1—WHITING #7.
1—MORRIS #9, w/skip, mixing ladle, never used.
2—WHITING, #8, EXCELLENT CONDITION, COMPLETE.
1—MODERN, #3, 46' shell, w/blower.
1—SKIP CHARGER, 3 bottom drop buckets, blower, motor, and scale for #9 Cupola.

CORE BLOWERS

1—CB-400 CHAMPION. 1—3K DEMMLER.
2—#2 REDFORDS. 1—#1 DEMMLER.
2—DEMMLER #4E. 1—#92 OSBORN.

DUST COLLECTING

1—CYCLONE Dust Collector, 10' dia. x 22" outlet.
1—SLY, 83" wide x 43" deep x 113" high, 4' hopper, 13" inlet, bag type.

FLASKS & CORE PLATES

400 TONS, CAST STEEL, STRUCTURAL STEEL and STERLING TYPE FLOOR FLASKS—ALL SIZES.

20 TONS, FLAT STEEL and PERFORATED STEEL CORE PLATES. SEND FOR COMPLETE LISTINGS

FURNACES—DIRECT ARC MELTING

1—150#/hr. "LECTROMELT".
1—250#/hr. Hydraulic Top Charge.
1—500#/hr. "LECTROMELT".
1—1 Ton WHITING Top charge.
1—2 Ton SWINDELL, Top charge.
1—6 Ton "LECTROMELT", Hyd., TC.
1—1,000# SWINDELL.
1—2 Ton WHITING top charge.
1—6 Ton HEROULT.
Several 3 Ton to 10 Ton capacity Side and Top Charge Furnaces.

FURNACES—DETROIT "ROCKING"

2—200# cap. DETROIT, complete.
3—350# cap. DETROIT, complete.
1—1000# cap. DETROIT, complete.
1—3000# cap. DETROIT, less Transformer.
1—1500# DETROIT, Complete.
1—60# DETROIT, Complete.

FURNACES—INDUCTION MELTING

1—20 KW AJAX Spark Gap High Frequency, 17 lb. capacity in steel.
2—60 KW, AJAX-TAMA-WYATT, Alum.
3—333 KW, AJAX-TAMA-WYATT, 1500# Alum.
1—175 KW, 960 Cy., MG Set, 1000# Cruc. NEVER USED.
1—166 KW, AJAX, 60 Cy., Alum.

FURNACES—OIL AND GAS

1—HAUSFELD Tilting #675, 250 cruc. Oil.
1—FISHER 4 Burner MNP, 1700#, gas.
3—WALKER YORK #400 cruc. tilting, coke fired.
1—HAUSFELD Tilting, 1200# Mag.
3—MONARCH Oil Fired Stat., #60 cruc.
5—FISHER 400# Tilting, Oil fired.
1—SKLENAR, 2000#, Oil Fired.

LADLES & POURING DEVICES

2—6 TON TEAPOT, Worm Geared.
1—10 TON WHITING, Lip and Bottom Pour, EZ mechanism, used once.
4—10 TON BOTTOM POUR, 55" x 55".
2—15 TON BOTTOM POUR, 65" x 59".
2—45 TON TREADWELL, Excellent.
1—20 Ton Lip Pour, 72" x 72".
1—SWINDELL, Elec. Holding.

MOLDING MACHINES

5—MILWAUKEE Jolt Pin Lift 32" x 38".
1—J & L #612 Port. Rollover, 24" x 30".
3—INTERNATIONAL "G", 24" x 10" Jolt Rollovers.
5—OSBORN Jolt Rollovers, Hand Draw, #142.
3—OSBORN 710J Jolt Squeeze Strippers, 16" x 25" table.
1—SPO Jolt Stripper, #3102, 36" x 51".
3—TABOR Jolt Squeeze in Head.
1—OSBORN #243 Jolt Rollover.
1—OSBORN #559 Jolt Stripper, 25" x 30".
1—DAVENPORT #28A Jolt Rollover.
3—HERMAN Rollover & Jar, 6000#, 60" x 80".
10—SPO #110 J Jolt Squeezers.
11—DAVENPORT #30-T Jolt Strippers.
2—OSBORN #405 Jolt Rollovers.
2—TABOR POWER ROLLOVERS, 30" x 40" table, 20" cyl., 12" draw.
2—TABOR POWER ROLLOVERS, #2242 w/clamps, late.
1—TABOR Jolt Stripper, 20" x 20", 4" draw.
1—SPO, 9336, Jolt Clamp rollover draw.

MULLERS AND MIXERS

1—SIMPSON #0, NEVER USED.
1—SIMPSON #2, Unit Drive.
2—SIMPSON #3, Complete w/SKIP HOISTS.
1—CLEARFIELD #404.
2—CLEARFIELD #610 and #920.
1—BEARDSLEY & PIPER #60 SPEEDMULLER, 60 HP motor, SKIP LOADER.
1—B & P Speedmuller, #40-83 w/skip.

OVENS

2—FOUNDRY EQUIPMENT, 2 compartment, 5' wide x 6' high x 10' deep, Oil Fired, Recirculating, Walk-in.
1—FOUNDRY EQUIPMENT, Oil Fired, 4 drawers.
2—ROSS 2 comp., rack, gas, 6½" x 14" " 7".
1—CRAWFORD, Gas Fired, 3 drawers.
1—HOTPOINT EDISON, ELECTRIC, 6 drawers, 30" x 40" x 8".
1—CORE OVEN, 82" high x 6' deep x 12' wide, 2 sets of drawers, gas or oil.
1—YOUNG BROS. 3 compartment, kiln type baking oven, electrically heated, with CONTROLS.
1—MAHON ANNEALING OVEN, GAS FIRED, 9' x 18' x 6½', 1600 degrees F., controls, recirculating.
1—DESPATCH TOWER, Gas Fired, 27 racks, 11' x 12' x 40'6" high.

SAND CUTTERS

5—AMERICAN SAND CUTTERS—
1—MODEL "AA", 60" reel, Gas Driven.
1—MODEL 'K", 72" reel, Gas Driven.
1—MODEL "F", 80" reel, Gas Driven.
1—MODEL "D", 76" x 96".
1—MOULDERS' FRIEND, 60", late.
1—SANDMASTER, 70/102, New in 1950, Rubber Tires.

SAND LABORATORY EQUIPMENT

1—TEST CORE BAKING OVEN #606.
1—MOISTURE TELLER #278T.

SAND PREPARATORS

1—REDDY SANDY UNIT.
2—JEFFREY SANDITIONERS, Portable.
5—SCREENERATORS, Size "S" and "M".
3—ROYER SAND BLENDERS, 16" belt, 12" belt, 8" belt.
1—LINK BELT REVIVIFIER, Size 5.
2—B & P SAND CONDITIONERS, portable.
1—LOWE GYRATORY RIDDLE.
1—HETHERINGTON & BERNER SAND DRYER, rotary, oil fired, #552.

SAND SLINGERS

1—BEARDSLEY & PIPER MOTIVE JR. 19" head.
1—BEARDSLEY & PIPER TRACTOR TYPE 16" head, magnetic separator.
1—PORTABLE SLINGER, 16" head, 4' long, on Truck.

TESTING MACHINES

1—TINIUS OLSEN, UNIVERSAL, 100,000# capacity.
1—TINIUS OLSEN, BRINNEL HARDNESS, 3,000 KG.
1—RIEHLE, UNIVERSAL, 2 screw mechanical, 100,000# capacity.
1—RIEHLE, BRINNEL HARDNESS, hydraulic, 3,000 KG.
1—ROCKWELL, HARDNESS, #5JR with "C" Brail.
1—BALDWIN - TATE - EMERY, UNIVERSAL, Hydraulic tensile, 24,000#.

TRUCKS

2—CLARK, FORK LIFT, 108" lift, Gas driven, low price.
1—HOUGH PAYLOADER, 1000# capacity, EXCELLENT condition.
2—BELL PRIME MOVERS, 1000# capacity, Gas driven.

UNIVERSAL MACHINERY AND EQUIPMENT CO.

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SELLING OUT PIECE BY PIECE

One of America's Largest Production Foundries

750 tons DAILY CAPACITY

Everything must be sold and removed to clear the premises.

5—AIR COMPRESSORS—Chicago Pneumatic Synchronous motor 3600 CFM, 2200 CFM and 1200 CFM. Ingersoll-Rand 800 and 600 CFM.

100—AIR TOOLS—all kinds.

200—BLOWERS and FANS—all sizes and types mancoolers, and vent fans up to 5-100 HP, 24 oz. cupola blowers, Spencer, Roots, Ingersoll-Rand and General Electric.

CHARGING SYSTEM—Atlas tape printing scale, buckets, Monorail Cleveland charger 400′ rail.

50—BRIDGE CRANES—mostly Cleveland 6′ to 20′ spans, some electrified.

43—CORE BLOWERS—Redford bench type, International SB 13 and 17's Osborn 93—193—193A Automatics.

10—CORE CONVEYORS flat belt 24′ to 95′ long, 32″ high complete with drives.

37—CORE DRAW MACHINES—SPO CD 36 or Ferro.

17—CORE GRINDERS—Milwaukee 70″ or Stoney 12″ to 18″ wheels, 60″ travel.

11—CORE OVENS—all combination oil or gas
- 4 Coleman 45′ Vertical Towers
- 1 Coleman 36′ Vertical Tower
- 2 Coleman Vertical Horizontal ovens
- 1 Coleman Vertical Horizontal 30″ x 12′ shelf
- 3 Coleman Double Door Car Type

CORE CONVEYORS—hundreds of feet with Jervis B. Webb 458 chain.

4—CORE PASTE OVENS—Coleman combination oil or gas 24″ x 62″ opening chain conveyor type.

35—COREMAKERS ROLLOVERS—most all sizes Osborn or International.

COOLING TOWER—casting cooling tower with hundreds of feet of 658 Jervis B. Webb chain.

4—CUPOLAS—Whiting #9's with controls.

10,000 ft. CONVEYORS—roller conveyor 8″ to 24″ heavy duty.

ELECTRIC MELTING FURNACE
Electromelt type R side charge
800 KVA 11000 volt transformer

FLASK RETURN—Conveyors.

50—GRINDERS—Snag Double End, swing frame, Gardner 179 flat disc.

200—HOISTS—Cleveland and Yale Electric, Ingersoll-Rand and Curtis Air and Peerless chain hoists.

HOT METAL DELIVERY SYSTEM
Cost over $60,000 in 1950. Electric driven monorail carriers and Cleveland track.

50—LADLES—Geared crane ladles 22″ x 22″.

LOCOMOTIVE CRANE—American 25 ton diesel 55′ boom, New 1951.

3—55″ MAGNETS

4—MOLDING CONVEYORS—car type, 300′—452′—490′ and 491′.

MOLDING MACHINES—all jolt squeeze pin lifts
- 12 Osborn 712 PJH
- 2 Osborn 724PJ
- 6 Osborn 726
- 2 Osborn 726 PJA with Hydra motors
- 11 International PK 20
- 7 International PKL 12-5

MULLERS—B & P 30's—40's and 60's with bucket loaders, Simpson #2—Link Belt pug mill type.

ROLLOVER CONVEYORS—10,000 ft extra heavy to light duty 8″ to 24″ widths.

SAND HANDLING EQUIPMENT—belt conveyors 18″ to 24″ flat belt and trough—bucket elevators—coke elevators and hoppers, aerators, pug mills, molders hoppers.

ROTOCLONES—most all sizes 8—16—24—27 wet and dry types.

SAND SLINGERS—B & P Stationary.

SCRAP YARD CRANES—5 and 10 ton DC Shepard Niles 68′ span—runway 249′ long, needs only a skin to make it a complete building.

2—SHOT BLAST—continuous type Pangborn handles cylinder heads, motor blocks or similar items.

WHEELABRATOR—American 48 x 48 with skip.

THIS IS ONLY A FRACTION OF THE ITEMS WE HAVE FOR SALE

WRITE **WIRE** **PHONE**

FERRO MACHINE AND FOUNDRY COMPANY

3155 EAST 66TH STREET • DIAMOND 1-7170 • CLEVELAND, OHIO

FOR SALE

AIR COMPRESSORS
1—150 H.P. 800 CFM Ingersoll-Rand two-stage 230V, 3 ph, 60 cy, with air receiving tank.
1—20 H.P. 110 CFM G-E two stage, 250 V. D.C.

AIR HOISTS
1—6 ton Detroit Pneumatic with trolley.
3—3-ton I-R, Thor, C-P.
2—2 ton Ingersoll-Rand Model D.
3—1 ton Ingersoll-Rand Model C.
12—Pendant Curtis Class G 1 to 3 ton.
8—Pendant Hanna 5" x 36" cyl.

CONVEYORS
5—Bucket elevators.
2—11" belt x 33'6" and 37' centers.
1—14" belt x 51' centers.
2—20" belt x 48'6" and 56' centers.
1—Bucket elevator for coke 80' centers, double strand chain and continuous buckets.
1—Sorting conveyor, 44' centers, 30" wide steel plates, L-B chain.
18—Sand handling conveyors.
2—18" belt x 38' and 155' centers.
1—20" belt x 122' centers.
12—24" belt x 25'6", 29'6", 40'6", 45', 69', 93'93'93', 93'93'106', and 118' centers.
2—30" belt x 33' and 42'6" centers.
1—36" belt x 30'.
3—Steel Apron Conveyors.
2—30" wide x 15' and 57' centers.
1—21" wide x 5'6" centers.
Roller Conveyor—8", 10", 30", and 36".
1—Link-Belt Roller Type Power Mold Conveyor, 27' x 70'6" centers, 35 cars 38" x 72", 45 ft. per min. with frame work, take-ups, idler corners, driving mechanism, speed reducer, motor and controls.
1—Pigmold conveyor 64' sprocket centers, Link-Belt complete with drive 220/440/3/60.

CORE BLOWERS
DEMMLER
2—#50 weight of core up to 6 lbs.
2—#2 weight of core up to 25 lbs.
1—#2K weight of core up to 25 lbs.
1—#3 weight of core up to 35 lbs.
1—#3E weight of core up to 35 lbs.
OSBORN
9—#92 weight of core up to 35 lbs.
1—#194-1 weight of core up to 100 lbs.

CRANES
1—3 ton—3 motor Bedford bridge crane, 40' span, double built up steel bridge with catwalk man cab, drum controls, roller collectors, 30 H.P. Hoist motor, 10 H.P. travel motor, 3 H.P. trolley motor, 220/440/3/60.
2—12' Cleveland hand traveling bridge cranes.
2—3 ton Shepard Cupola Charging Cranes, DC 550V, cab operated, with monorail.
Gib cranes ¼ to 2 tons.

FURNACES AND BLOWERS
FURNACES
STROMAN
2—200/225 NP hydraulic tilt with blowers.
1—#14 Non-tilt Crucible.
CAMPBELL-HAUSFELD
1—#40 Non-tilt Crucible.
2—2000# IPNT electric tilting, 2 burners.
BELLEVUE
4—#200 with oil burner, hand tilting.
FISHER
1—#225 Nose Pour, hand tilting.
1—#500 MNP Nose Pour, electric tilting.
2—#1000 Rotary hand tilting, oil burners.
ELECTRIC
1—6000 lbs. Heroult-Lectromelt, 3000 KVA 13200 primary volts, 239-85 secondary volts, Delta Y with taps, 3 phase 60 cycles, complete controls.
HEAT TREATING
1—G. E. 30" x 42" 1800° 37 KW 220V, 1 ph, 168 amps.
ANNEALING
1—Bellevue Combination Oil & Gas with controls.
FURNACE BLOWERS
3—3 H.P. 300 CFM 16 oz. 220/440/3/60.
3—7½ H.P. 975 CFM 16 oz. 220/440/3/60.
1—15 H.P. 2100 CFM 16 oz. 220/440/3/60.
CUPOLA BLOWERS
1—Spencer Turbine, 50 H.P., 6750 CFM, 16 oz., 220/440/3/60.
1—North-American, 20 H.P., 1950 CFM, 20 oz., 220/440/3/60.
1—Piqua Size 5½, 6000 CFM, 16 oz., 220/3/60, 30 H.P.
EXHAUSTERS
1—Sturtevant Silentvane, Size 75, 5 H.P., 220/440/3/60.
1—Sturtevant, Size 6, Type CS, 10 H.P., 220/3/60.

GRINDING EQUIPMENT
2—Fin Cleaning Machines for cylinder heads—Ireland.
1—#230 Gardner double end disc, 30" wheels, V-belt.
3—5 H.P. Safety Emery Wheel Co., 18" x 3" wheels, 220/440/3/60.
1—10 H.P. Black & Decker dble. end 20" x 3" wheels, 220/440/3/60.
1—15 H.P. U. S. Electric double end, Model 65 double end, 4 speeds.
1—7½ H.P. Universal Swing Grinder, 220/440/3/60.
3—20 H.P. Marshke Swing Grinders, 440/3/60.
1—#24 Gardner Horizontal disc grinder, 54" diameter, 20 H.P., 220/440/3/60.
1—#19 Besly Horizontal disc grinder, 52" diameter, 15 H.P., 220/3/60.

LADLES
MODERN & WHITING
15" to 27½" diameter, 250 lbs. to 2000 lbs. capacity with Modern type FA Pouring devices.
2 ton and 3 ton Teapot spout, E-Z Pour enclosed gearing.
2—6000 lbs. Modern Mixing ladles.

MOLDING MACHINES
JOLT ROLLOVER AND PATTERN DRAW
DAVENPORT
2—SA-28, 1500 lbs. jolt, 12" draw, 30" x 40" table, air clamps.
2—SA-34, 2500 lbs. jolt, 15" draw, 34' x 48" table, air clamps.
HERMAN
2—6000 lbs. jolt, 42" x 60" table, air clamps, pit type.
1—9400 lbs. jolt, 40" x 84" table, air clamps, pit type.
JOHNSTON & JENNINGS
1—918, 18" draw, 2000 lbs. jolt, 44" x 54" table.
OSBORN
2—405-95, 26" draw, 3500 lbs. jolt, 40" x 60" table.
2—602, 36" flask, 600 lbs. jolt.
6—601-13, 10" draw, 900 lbs. jolt.
8—2047-4, 8" draw, air clamps.
1—422 with swing out table.
SPO
1—9336, 9½" draw, 800 lbs. jolt, 22" x 28" table.
TABOR
2—22" x 32" table, 10" draw, 600 lbs. jolt, air clamps.
1—24" x 42" table, 10" draw, 600 lbs. jolt, air clamps. Never used.
JOLT SQUEEZE PIN LIFT
INTERNATIONAL
1—LJSK Hand lever pin lift, 6" draw, 18" x 24" table.
MILWAUKEE
1—145-1, 8" draw, 1700 lbs. jolt, 25" x 30" table, 14" squeeze cyl.
OSBORN
2—814-P Stationary, 8" draw, 700 lbs. jolt, 14" squeeze cyl.
1—714PJ Stationary, 7" draw, 20" x 31" table, 14" squeeze cyl.
5—720 Stationary.
1—721 Stationary.
JOLT SQUEEZERS
HAYNES
INTERNATIONAL LJS
MILWAUKEE 124-6, 103
MODERN
OSBORN 275J, 210PJ
SPO 113P
TABOR
JOLT STRIPPERS
DAVENPORT
1—34-AJS, 12" draw, 2500 lbs. jolt, 36" x 46" table.
INTERNATIONAL
1—JFL Foot lever lift, 3" draw, 600 lbs. jolt, portable.
3—LP-6, 8" draw, 1000 lbs. capacity, Pins adj. 16" to 24".
JOHNSTON & JENNINGS
1—68SP, 8" draw, 600 lbs. jolt, 25" x 30" table, portable.
OSBORN
1—559, 6" draw, 1200 lbs. jolt, 25" x 30" table.
1—559-HD, 6" draw, 1200 lbs. jolt, 25" x 30" table, portable.
1—561-41, 12" draw, 5000 lbs. jolt, 40" x 50" table, pit type.
HERMAN
2—40" x 60" table, 6000 lbs. jolt.
1—36" x 36" table, 3000 lbs. jolt.
ROCKOVER AND DRAW
INTERNATIONAL
4—"R" hand ram, hand rollover, 8" and 10" draw.
3—"RJ" power jolt, hand rollover, 8" draw, 14" x 20" table.
MODERN
2—2-38 hand ram, hand rollover, hand draw.
OSBORN
1—147-1, 20" x 60" core box max.
1—146, 24" x 32" core box max.
PRIDMORE
2—hand ram, power rollover.
SPO
1—506, 24" x 25" table, 600 lbs. jolt, 10" draw, stationary.
CHAMPION
2—Type W 22" hand rollover, 12" draw.
1—Type W 16" hand rollover, 8" draw.
PUSHOFF
2—size 38" x 40" Champion, 10" draw.
1—Osborn 3' x 16' table.
PLAIN JOLT
1—Osborn No. 98, 220 lbs. jolt, 12" x 12" table.
1—Tabor Model B-4, 700 lbs. jolt, 18" x 24" table.
1—Tabor Model B-6, 1300 lbs. jolt, 36" x 36" table.
2—International, Type J, 1300 lbs. jolt, 31" x 44" table.
1—International, Type J, 3000 lbs. jolt, 36" x 48" table.
1—International, Type J, 10,000 lbs. jolt, 76" x 76" table.
SHELL MOLDING MACHINE
1—Shalco, Model CO-1, ser. #79, new condition.

SCALES
TOLEDO
1—6500 lbs. dial floor scale, 5' x 7' platform.
FAIRBANKS-MORSE
2—Printomatic dial scales.
1—Core Sand scale with hopper.

SAWTABLE
TABOR
1—Abrasive cutoff, 10 H.P., 220/440/3/60.

SAND SLINGERS
1—Motive Junior Beardsley-Piper, 19" head, 4" tip, 220/3/60.

SHAKE-OUTS
ROBBINS
1—4' x 10', 12,000 lbs. capacity with 7½ H.P., 220/440/3/60 "Floatex".
SIMPLICITY
1—4' x 6', Model D, 16,000 lbs. capacity, 10 H.P., 220/440/3/60.
MIDWEST
1—120' x 36" Apron shakeout conveyor.

SAND MULLERS
SIMPSON
1—#2 Style UD with skip hoist, 220/3/60, 20 H.P.
2—#2 Model H, Type E with skip bucket, 220/440/3/60, 20 H.P., 14 cu. ft.
1—#3 Model H, Type E, 220/440/3/60, 60 H.P., 30 cu. ft.
3—#3 Model C, Type E, 220/440/3/60, 60 H.P., 30 cu. ft.
BEARDSLEY-PIPER
2—#70, 29-58 tons per hour, 18 cu. ft. per batch, 100 H.P., 220/440/3/60.
1—#30, 6½-13 tons per hour, 4 cu. ft. per batch, 20 H.P., 220/440/3/60.
LINK-BELT
1—Paddle type, 20" x 72".
1—Pugmill, 42" x 96".
BLYSTONE
1—#2A—5 cu. ft., 3 H.P., 220/440/3/60.

SAND CONDITIONERS
ROYERS
1—NB-4, 7 to 10 tons per hour, ¾ H.P., 1750 RPM motor.
2—C-2, 10 to 15 tons per hour, 1½ H.P., 1750 RPM motor.
LINK-BELT
1—Aerator with drive and motor.
RAPP
1—No. 27 Revivifier.
AMERICAN
2—Sand Cutters, Type AA, 4' 8" and 5' 2", 220/440/3/60.
1—Sand Cutter, Type 74-50 "AM", 440/3/60.

SAND BLAST EQUIPMENT
PANGBORN
1—6' Rotoblast table, Type LG.
AMERICAN WHEELABRATOR
1—42" x 48" Wheelabrator, 220/440/3/60.

MAGNESIUM CLEANING CABINETS
8—Cabinets, 8000 CFM with Buffalo Exhausters, 7½ H.P., 220/440/3/60.

TUMBLING MILL
1—Sly Model 00 tilting type barrel with shot return.

EUCLID FOUNDRY & MACHINE EQUIPMENT COMPANY
14919 SARANAC ROAD — TELEPHONE: GLENVILLE 1-1222 — CLEVELAND 10, OHIO

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ONE OF AMERICA'S LARGEST ALUMINUM PRODUCTION FOUNDRIES.

200,000 lbs. DAILY CAPACITY • **TO BE HELD ON THE PREMISES**

3516 HART AVENUE DETROIT, MICHIGAN

TUESDAY, FEB. 22, 1955 STARTING AT 10:00 A.M.

10—CORE OVENS

4—Maehler 7' x 8' x 12', car type.
4—Ross 6' x 7½' x 11', car type.
2—Detroit Vertical Tower 45'.
1—Despatch vertical tower 31'.
1—Maehler Horizontal pass 50' x 22' x 30'.

75—MOLDING MACHINES

4—Osborn No. 210P Jolt Squeezers.
6—Osborn No. 275J Jolt Squeezers.
2—Osborn No. 243 W. Jolt Rockover, Pattern Draw.
4—Osborn No. 405 Jolt Rollover Pattern Draw.
2—Osborn No. 406 Jolt Rollover Pattern Draw.
10—Osborn No. 601 & 602 Jolt Rollover Pattern Draw.
5—Osborn No. 721 Jolt Squeeze Strippers.
2—Milwaukee No. 196 Jolt Squeeze Strippers with roll on and roll off attachments.
2—Herman 42" x 78", 6000 lbs. series jolt rollover pattern draw.
25—Core Rollover Machines, Osborn's, SPO's, etc.

15—CORE BLOWERS

Redford, Osborn 92-192, Demmler #1-2- & 3-E, Federal #CB-40.
San Blo.
Core Rod straighteners, Climax #2 & #3, American Style D 1¼".
Lewis #7.

AIR COMPRESSORS

1—Sullivan Class WM-3, 694 CFM, 125 HP, Synchronous motor.
1—Ingersoll-Rand, Model X-13-10, horizontal 2 stage, 100 HP motor.
1—Worthington Steam Driven size 14"/26" x 23"/14" x 20" with after cooler.

SAND MULLERS

2—Simpson No. 2 Sand Mullers, unit drive type, complete with 20 HP motors, skip hoist loaders, watering devices and dust hoods.

LABORATORY EQUIPMENT

2—G.E. X-Ray units Model KX10, 140 KV.
2—G.E. X-Ray viewers, type GI.
3—Brinnell Glasses.
1—Inspection Viewer.
1—G.E. Film Drier, Model X3-1017-A.

CLEANING ROOM EQUIPMENT

1—U. S. and Standard Snag Grinders, 10-15-20 HP, 24" x 12", 30" x 12".
6—Crescent & DeWalt Band and Cut-off saws.
Sly Blast Cabinets and Rooms.

SAND HANDLING SYSTEMS

BARTLETT & SNOW

2—Simpson Sand Mullers #2, style UD, with generators.
2—Bartlett & Snow 45' elevators.
1—Storage Bin 20 ton.
1—Sand Distribution Belt 120'.
12 Molding Hoppers.
200' Sand Recovery Conveyor with 4 x 6 shakeout.
1—Palmer-Bee weighing hopper with 2000 lb. dial scale.

Link Belt

1—Simpson Sand Muller #2, Style UD.
2—Bucket Elevators, 45'.
1—Storage Hopper 20 ton.
1—Palmer-Bee weighing hopper with 200 lbs. dial scale.
1—Distribution Belt 120' long.
25—Sand Recovery Conveyor 24" with shakeout.

SAND HANDLING EQUIPMENT

1500' Overhead Troughing conveyors, assorted lengths from 30' to 150' x 18", including Colinoid operated hoppers.

POWER MOLD CONVEYOR

1—344' of track, 49 cars, car top measuring 36" x 72", complete with motor and drives, new in 1951, at a cost of $37,000. Condition — Like New.

MISCELLANEOUS

400 Air Tools.
Complete Pattern Shop.
Complete Machine Shop.
Large assortment of motors, blowers and exhausters.
6—Dust Collectors.
20—Straightening plates.
2—P & P Hiliarc Welders.
25—Mancooling fans.
100 HP M E set.
Scales.
Impregnator.
Hundreds of other items too numerous to mention.

HEAT TREAT FURNACES

1—INDUSTRIAL Heat Treat Furnace, preheat gas fired, heavy duty, 5' x 7'6" x 8' H., complete with Air Heater, 3 HP motor and controls.
1—INDUSTRIAL Heat Treat Furnace, gas fired, continuous conveyor type, 8' W. x 16" H. x 45' L., chamber complete with slat conveyor.
1—INDUSTRIAL Heat Treat Furnace, gas fired, car type, 14'6" L. x 6'6" W., complete with heater, run-out car, electric door hoist and controls.
5—LINDBERG - FISHER Heat Treat Furnace, gas fired, Model 4860-GH, Cyclone type with working chamber 48" diameter x 60" deep, comp. with burners & controls.
1—INDUSTRIAL Heat Treat Furnace, gas fired, Circ-air car type, 14'6" L. x 6'6" W., complete with heater, blower, electric door hoist and controls.
1—LEEDS & NORTHROP Heat Treat Furnace, Homo Electric tempering, 75 KW, vertical type with work chamber 36" diam. x 48" high, complete with controls.
1—ELECTRIC FURNACE CO. Heat Treat Furnace, electric 250 KW, car type, 6' x 6' x 14', complete with controls.

MATERIAL HANDLING EQUIPMENT

8—Overhead Cranes 2 to 5 tons, some cab operated, 30' to 40' spans, complete with runways, AC. 220/440.
40—Ingersoll-Rand Air Hoist, 700 lbs. to 4000 lbs. cap.
3000'—American Mono-Rail.
10—Job Cranes and hoists.
6—Clark Lift Trucks, 3000, 4000 and 6000 lbs. cap. gas and electric.
30—4 wheel platform trucks.
10—Hand chain falls.
3000'—Roller Conveyor 14"—16"—18"—24", all above rail, heavy duty.
3—Fork Hand Lift Trucks.

MELTING EQUIPMENT

35—Bellevue crucible tilting furnaces 500#.
1—Hausfeld Crucible electric tilt 225#.
9—Bellevue Holding furnaces 600#.
2—Reverberatory furnaces.

DOUBLE KNOCKOUT & VENTILATING SYSTEM

BARTLETT & SNOW MFG.

20—Grates, steel knockout type, 6' x 5'.
2—Hoppers, steel const. 50' long.
2—Apron Conveyors, steel 60' centers.
2—Vent Hoods with Grated Backwall and Vent Stack.
2—Blowers, siphon type American size 11 with motor, 40 HP GE 1180/220-440 & Cont.
2—Tumblers, barrel type complete with Breaker Screen, with 10 HP motor G.E. 115/220-440 and Speed Reducer, Link Belt Size 88.
3—Conveyor Belts and (1) Bucket Elevator.

FREE ILLUSTRATED AUCTION CIRCULAR ON REQUEST.

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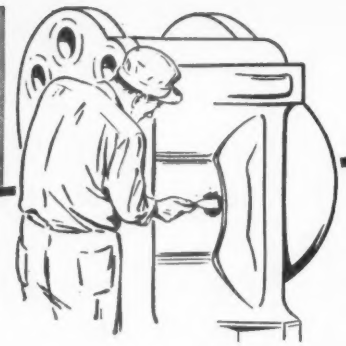


These features mean

BETTER LOOKING

CASTINGS

TIGHT, LASTING REPAIRS

When correcting blow or sand holes, surface blemishes, or rough and porous areas in castings, you can depend on Smooth-On Foundry Cements, standard of the industry for more than 55 years. They are easy to apply, harden quickly, stay firmly in place.

FOUR DIFFERENT SHADES

With 4 different shades to pick from, you know you can get a close match for your castings.

4AA—Light gray, fine texture
4A —Medium gray, medium texture
4B —Dark gray, coarser texture also
9—Bronze or Brass

UNIFORM QUALITY

Rigid quality control means you can be sure that the strength and color of Smooth-On Foundry Cements will not vary from one order to the next. Every lot of Smooth-On cements is laboratory tested and must satisfy tests for setting time, hardness, and color before it is packed for shipment.

FREE SAMPLES

Why not try one or more of these Foundry Cements at our expense? We will be glad to send you a free sample of any of the cements described above if you will write us on your business letterhead. Write today, and see how Smooth-On can improve the appearance of your castings.

SMOOTH-ON MFG. CO. DEPT. 17
570 Communipaw Ave., Jersey City 4, N. J.

SMOOTH-ON
FOUNDRY CEMENTS

SO-389

Prime-Mover in background with bucket for hauling sand and other loose bulk. The unit in foreground has platform loaded with 100 lb. sacks of binder. Bucket and platform quickly interchangeable.

This foundry tried one Prime-Mover —and now has 3 of them!

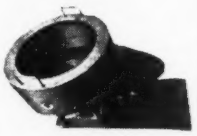
Dodge Steel Company, Philadelphia, has a major handling problem hauling materials from storage to foundry bins. Mr. Charles Wellens, maintenance engineer at Dodge, says: "Our first Prime-Mover has been in operation over a year. We have had no maintenance on it except to adjust the clutch once. This is good performance when you consider the abrasive material present in a foundry. The two other units were added later after we became certain we could save money by using Prime-Mover." May we tell you more about Prime-Mover for your own plant?

THE PRIME-MOVER COMPANY
MUSCATINE, IOWA

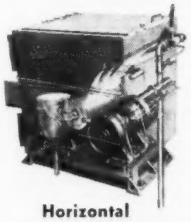
THE Bell PRIME-MOVER

CENTRIFUGAL CASTING MACHINES

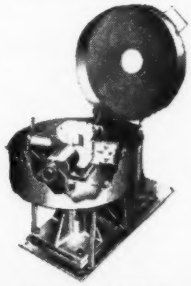
Vertical



Vertical Water-Cooled



Horizontal Water-Cooled



Precision Casting

These machines used to make ferrous and non-ferrous centrifugal castings are produced by the pioneer manufacturer of such equipment.

They are made in a large variety of styles and a wide range of sizes. Complete technical information is supplied concerning sand and permanent mold design, gating, sand mixes, speeds, etc.

Send us drawings or sketches of parts you are interested in casting centrifugally, and we will tell you, without obligation, if and how our machines can cast them faster, cleaner and with fewer rejects.

CENTRIFUGAL CASTING MACHINE COMPANY
P. O. Box 947 Tulsa 1, Okla.

ADVERTISING INDEX

A

Abrasive Shot & Grit Co., Inc. 239
Acheson Colloids Co. 161
Acme Foundry Co. 256
Adams Co., The 18
Aeroquip Corp. 116
Ajax Electric Co. 52
Ajax Electric Furnace Corp. 52
Ajax Electrothermic Corp. 52
Ajax Engineering Corp. 52
Allied Chemical & Dye Corp., Semet-Solvay Div. 244
Allis-Chalmers 8
Alvey-Ferguson Co., The, of Cincinnati .. 138
American Air Filter Co., Inc. 113
American Brake Shoe Co., Electro-Alloys Div. 236
American Bridge Div., United States Steel Corp. 169
American Chain & Cable, American Chain Div. 231
American Chain & Cable, Wright Hoist Div. 27
American MonoRail Co. 163
American Optical Co., Safety Products Div. 187
American Smelting & Refining Co., Federated Metals Div. 188
American Wheelabrator & Equipment Corp. 55, 61
Apex Smelting Co. 185
Archer-Daniels-Midland Co., Foundry Products Div. 4, 5
Aro Equipment Corp., The 205
Automotive Pattern Co. 238

B

Babcock & Wilcox Co., The, Refractories Div. 66
Baird Associates, Inc. 24
Bartlett, C. O., & Snow Co., The .. Back Cover
Bay State Abrasive Products Co. 182, 183
Beardsley & Piper Div., Pettibone Mulliken Corp. 141, 142, 226, 227
Brummeler Steel Products Corp. 259

C

Carborundum Co., The .. 50, 51, 75, 229, 251
Carl Mayer Corp., The 15
Carpenter Brothers, Inc. 242
Centrifugal Casting Machine Co. 270
Chambersburg Engineering Co. 148
Chicago Eye Shield Co. 155
Christiansen Corp. 13
Cincinnati Milling Machine Co., The, Cincinnati Milling Products Div. 40, 41
Cities Service Oil Co. 173
Clark Equipment Co., Construction Machinery Div. 37
Clark Equipment Co., Industrial Truck Div. 59
Clayton Silica Co. 244
Clearfield Machine Co. 69
Cleveland Crane & Engineering Co., The, Cleveland Tramrail Div. 199
Cleveland Flux Co., The 129
Cleveland Metal Abrasive Co., The 192
Cleveland Tramrail Div., The Cleveland Crane & Engineering Co. 199
Cleveland Vibrator Co., The 253
Colonial Abrasive Products Co. 122
Columbia-Southern Chemical Corp. 255
Columbiana Pump Co., The, Machine Div. 74
Corn Products Refining Co. 36
Crobaugh, Frank L., Co., The 258

D

Dayton Pneumatic Tool Co. 256
DeBardeleben Coal Corp. 256
Delta Oil Products Co. 63
Demmler, Wm., & Bros. 67
Denver Equipment Co. 221
Desmond-Stephan Mfg. Co. 198
Despatch Oven Co. 220
Detroit Electric Furnace Div., Kuhlman Electric Co. 62
Detroit Testing Machine Co. 250
Dings Magnetic Separator Co. 171
Dow Corning Corp. 53
Durez Plastics & Chemicals, Inc. 203

E

Eastern Clay Products Dept., International Minerals & Chemical Corp. 241
Eastman Kodak Co., X-Ray Div. 147
Electric Furnace Co., The 248
Electro-Alloys Div., American Brake Shoe Co. 236
Electro Metallurgical Co., A Div. of Union Carbide & Carbon Corp. 49

F

Fanner Mfg. Co., The 179
Federal Foundry Supply Co., The ... 2, 56, 57
Federated Metals Div., American Smelting & Refining Co. 188
Ford, M. A., Mfg. Co., Inc. 186
Foundry Equipment Co., The 16, 17
Foxboro Co., The 68
Fremont Flask Co., The 60
Fuller Co. 58

G

Gerotor May Corp. 216
Giffels & Vallet, Inc. 132
Girdler Co., The, Div. of National Cylinder Gas Co. 174
Great Lakes Carbon Corp., Electrode Div. 201

Continued on Page 272

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Main 1-8260

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ADVERTISING INDEX

Great Western Mfg. Co. ... 273

H

Harbison-Walker Refractories Co. ... 11
Harnischfeger Corp. ... 197
Harrisburg Steel Corp., Taylor-Wharton Iron & Steel Co. Div. ... 257
Haylco Controls Corp. ... 248
Herman Pneumatic Machine Co. ... 124, 125
Hickman, Williams & Co. ... 133
Hines Flask Co., The ... 150, 151
Hough, Frank G., Co., The ... 46, 47

I

Illinois Testing Laboratories, Inc. ... 245
Imperial Belting Co. ... 10
Industrial Crane & Hoist Corp. ... 25
Ingersoll-Rand ... 139
Injection Molders Supply Co. ... 258
International Minerals & Chemical Corp., Eastern Clay Products Dept. ... 241
International Molding Machine Co. ... 159
International Nickel Co., Inc., The ... 1
Ironton Fire Brick Co., The ... 180

J

Jaeger Machine Co., The ... 20, 21
Johns-Manville ... 170, 200
Johnston Mfg. Co. ... 204
Joy Mfg. Co. ... 7

K

King, Andrew ... 257
Knight, Lester B., & Associates, Inc. ... 224
Kuhlman Electric Co., Detroit Electric Furnace Div. ... 62

L

Laclede-Christy Co., Div. of H. K. Porter Co., Inc. ... 208
Lanly Co., The ... 9
Lindberg Engineering Co., Lindberg-Fisher Div. ... 233
Lindberg-Fisher, A Div. of Lindberg Engineering Co. ... 233
Linde Air Products Co., A Div. of Union Carbide & Carbon Corp. ... 70
Link-Belt Co. ... 195
Lithium Corp. of America, Inc. ... 54

M

Macklin Co. ... 189
Macleod Co., The ... 245
Magnaflux Corp. ... 42
Magnet Cove Barium Corp. ... 145
Manhattan Rubber Div. ... 22
Master Pneumatic Tool Co., Inc., The ... 255
Metal Blast, Inc. ... 202
Milwaukee Chaplet & Mfg. Co. ... 149
Modern Equipment Co. ... 274
Monsanto Chemical Co., Plastics Div. ... 23
Muller Machinery Co., Inc. ... 259
Mullite Refractories Co., The ... 72
Murphy, Jas. A., & Co., Inc. ... 260

N

National Carbon Co., A Div. of Union Carbide & Carbon Corp. ... 177
National Cylinder Gas Co., The Girdler Co. Div. ... 174
National Engineering Co. ... 64, 65
Neff & Fry Co., The ... 204
Newage International ... 259
Newaygo Engineering Co. ... 28, 29
Newcomb-Detroit ... 258
Nicholls, William H., Co., Inc. ... 30
North American Refractories Co. ... 115
Norton Co. ... 38, 39, 111, 131

O

Ohio Electric Mfg. Co., The ... 258
Olin Mathieson Chemical Corp., Industrial Chemicals Div. ... Inside Front Cover
Oliver Machinery Co. ... 257
Orefraction, Inc. ... 164
Osborn Mfg. Co., The ... 156, 157

P

Pangborn Corp. ... 31
Penn Iron Works, Inc. ... 255
Penola Oil Co. ... 235
Pettibone Mulliken Corp., Beardsley & Piper Div. ... 141, 142, 226, 227
Pickands Mather & Co. ... 211
Pittsburgh Coke & Chemical Co. ... 137
Pittsburgh Lectromelt Furnace Corp. ... 71
Pittsburgh Metals Purifying Co. ... 6
Porcelain Products, Inc. ... 230
Porter, H. K., Co., Inc., Laclede-Christy Co. Div. ... 208
Prime-Mover Co., The ... 270

R

Radium Chemical Co., Inc. ... 218
Raybestos-Manhattan, Inc. ... 22
Reda Pump Co. ... 250
Redford Iron & Equipment Corp. ... 219
Reichhold Chemicals, Inc. ... 135
Republic Coal & Coke Co. ... 258
Rice Pump & Machine Co. ... 257
Ross Operating Valve Co. ... 43
Rotor Tool Co., The ... 215
Roura Iron Works, Inc. ... 242
Royer Foundry & Machine Co. ... 109

S

Sall, George, Co., Inc., The ... 252
Schneible, Claude B., Co. ... 32
Schrader's, A., Son, Div. of Scovill Mfg. Co., Inc. ... 19
Scovill Mfg. Co., Inc., A. Schrader's Son Div. ... 19
Semet-Solvay Div., Allied Chemical & Dye Corp. ... 244
Shanefelt Mfg. Co., The ... 127
Shepard Niles Crane & Hoist Corp. ... 14
Sidley, R. W., Inc. ... 258
Silent Hoist & Crane Co. ... 253
Simonds Abrasive Co. ... 223
Sly, W. W., Mfg. Co., The ... 134
Smillie, C. M., & Co. ... 239
Smith Oil & Refining Co. ... 191
Smooth-On Mfg. Co. ... 270
Sonken-Galamba Corp. ... 238
SPO, Inc. ... 119, 166, 167
Standard Conveyor Co. ... 172
Standard Electrical Tool Co., The ... 249
Standard Horse Nail Corp. ... 251
Stearns Magnetic, Inc. ... 214
Sterling Wheelbarrow Co. ... 76, 218
Stevens, Frederic B., Inc. ... Inside Back Cover
Sutter Products Co. ... 26

T

Tabor Mfg. Co. Div. of Turbo Machine Co. ... 247
Tamms Industries, Inc. ... 252
Taylor, S. G., Chain Co. ... 190
Taylor-Wharton Iron & Steel Co. Div. of Harrisburg Steel Corp. ... 257
Thiem Products, Inc. ... 217
Timken Roller Bearing Co., The ... 73
Turbo Machine Co., Tabor Mfg. Co. Div. ... 247

U

Union Carbide & Carbon Corp., Electro Metallurgical Co. ... 49
Union Carbide & Carbon Corp., Linde Air Products Co. ... 70
Union Carbide & Carbon Corp., National Carbon Co. ... 177
Union Wire Rope Corp. ... 45
United Oil Mfg. Co. ... 44
United States Graphite Co., The, Div. of the Wickes Corp. ... 154
United States Steel Corp., American Bridge Div. ... 169
United States Steel Corp., Subsidiaries ... 169
Universal Engineering Co. ... 48

W

Wellman Bronze & Aluminum Co., The ... 12
Westover Engineers ... 256
Whitehead Brothers Co. ... 35
Whiting Corp. ... 121, 213
Wickes Corp., The, The United States Graphite Co. Div. ... 154
Willson Products, Inc. ... 243

Table of Contents, Page 3

Classified Advertisers, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269

For Further Information On Anything Advertised In This Issue, Use One Of The Handy Cards—Page 175

Step ahead in this five billion dollar market with

Foundry's

PLUS 5 SERVICE

What is PLUS 5? It's your key to more business from foundries. It gives every FOUNDRY advertiser a bonus he can get from no other source. Here is help in analyzing this market—studying sales territories and potentials—planning the sales effort—and creating a constructive promotion program to the 5 billion dollar foundry market. It's time to take a new look at this market—and at the unusual selling aids we have for you. Say PLUS 5 to your FOUNDRY representative and he'll show you this 5-step program designed to move more of your products into foundries

A Penton Publication

FOUNDRY

more than a magazine . . . a complete sales development service

Penton Building, Cleveland 13, Ohio

Multiply Your Labor Force —Increase Plant Efficiency *Without Adding a Man!*

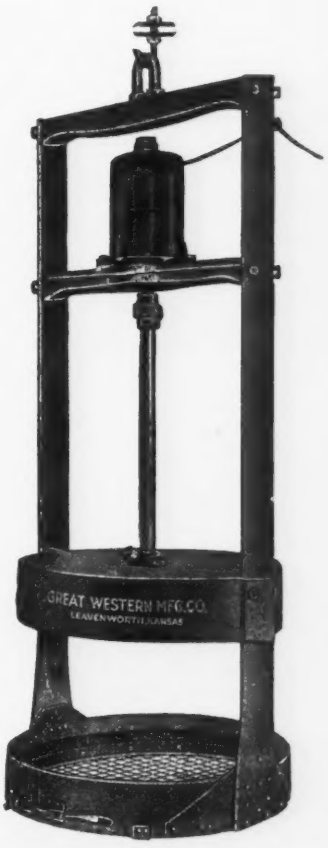
With a Combs Gyratory Foundry Riddle you increase your plant output—literally "multiply your labor force"—and you don't have to add a single man!

Combs Riddles offer fast, low-cost operation. Here's improved quality for your work—whether you're sifting, mixing, aerating your sand.

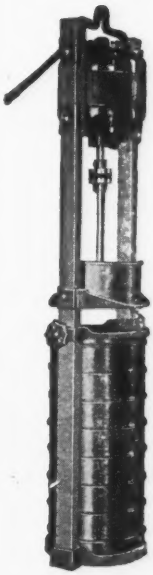
Write for illustrated folder. You're sure to see a Combs Gyratory Foundry Riddle that is designed just for your plant. Remember the Combs Machines have twice the capacity of other machines.

TYPE "CS"
with 24″ square screen and automatic discharge $320.00

TYPE "V"
with 20″ sieve $250.00
also made with
36″ sieve . . . $450.00



TYPE "CR"
with 24″ sieve
$310.00



TYPE "HL"
Lab sifter for sand control $225.00 (without sieves)

Prompt Delivery From Your Foundry Supply House

GREAT WESTERN MANUFACTURING CO.
LEAVENWORTH, KANSAS

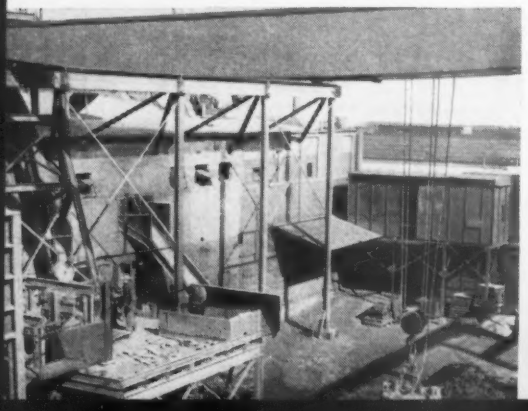
Costs on CHARGING and MELTING Are Down Because

this major producer* of castings has planned well with MODERN engineers in the synchronization of every handling operation:

The 165 cu. ft., self-tripping bucket conveys coke and stone, by crane, from car unloader to bin and batch larry. Scrap and pig are charged directly into the weigh hopper.

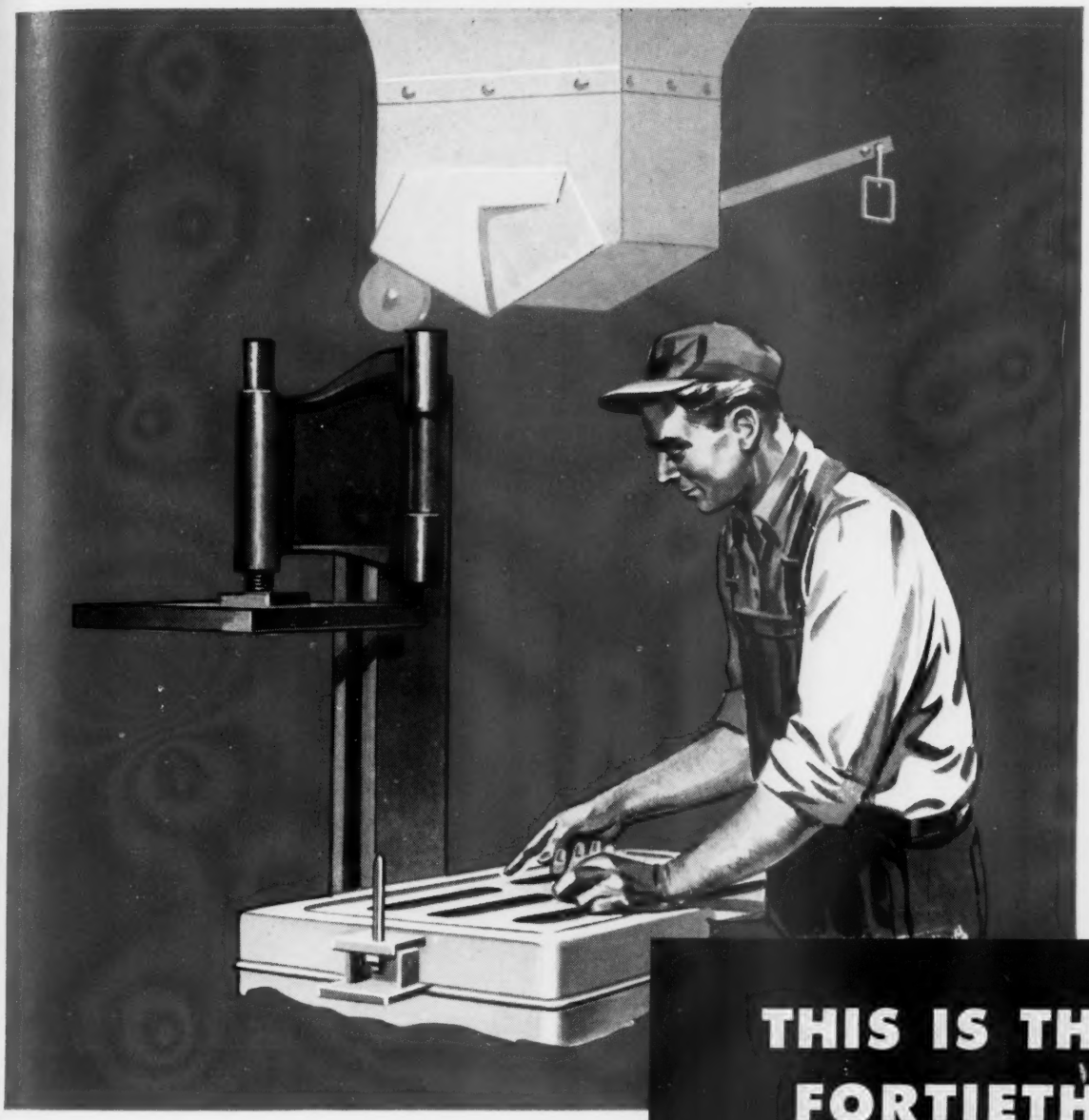
*Lakey Foundry Corporation, Muskegon, Michigan is a major producer of grey iron castings for the automotive, agricultural and household appliance industries.

All components flow mechanically from gondola cars, through MODERN 108" cupolas, to the molds on the pouring floor. Undercar unloaders . . . coke and stone buckets . . . bins . . . hoppers . . . scales . . . MODERN Small-Cone charging bucket . . . inclined-swivel charger and the melting equipment team together to pull down costs while boosting the over-all quality.



Much of this controlled, time-proved mechanization is described in bulletin S-147-B. A note on your letterhead will start our thinking about ways to cut your costs RIGHT NOW while we're planning together for tomorrow's expansion . . .

MODERN EQUIPMENT COMPANY
Port Washington, Wisconsin



THIS IS THE FORTIETH MOLD . . .

from one application of STEVENS LIQUID PARTING

That's normal experience in a large Midwest foundry that averages 1200 tons of castings per month. They use Stevens Liquid Parting for all of their molding operations. Here's why:

- Stevens Liquid Parting gives up to 60 molds from one application.
- Patterns are left clean, with no adhering sand.
- Molders save time . . . increase production with each mold because they do not have to shake parting on the patterns each time.
- Molds always give smooth castings since sand separates cleanly.

Stevens Liquid Parting can be the answer to your molding problems. Why don't you try Stevens Liquid Parting?

Write for a sample — or call your Stevens representative today.

Exclusive sales agents for Sutter foundry equipment in the United States.

See the Sutter Products advertisement elsewhere in this issue.

FREDERIC B.

STEVENS

INCORPORATED

EVERYTHING FOR A FOUNDRY

DETROIT 16, MICHIGAN

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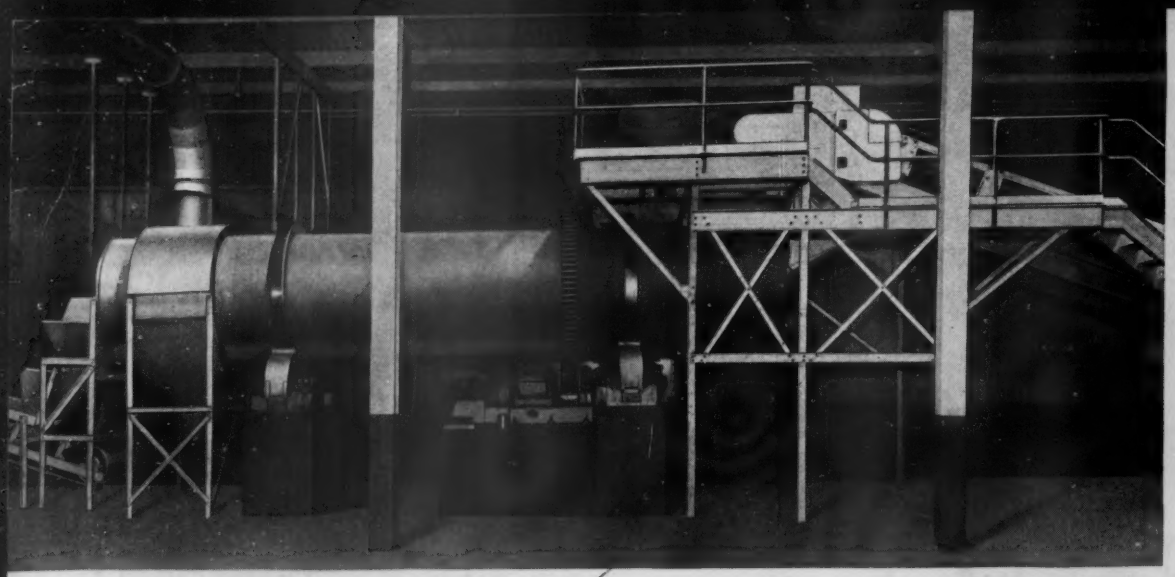
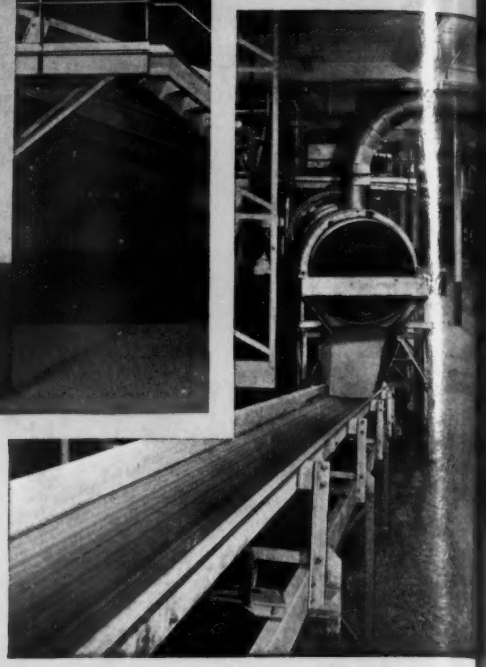


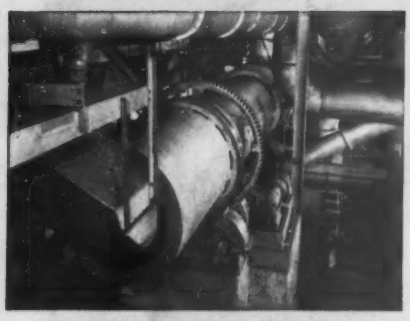


Above: Side View of Continuous Sprue Mill Showing Inclined Apron Feeder and Belt Conveyor Handling Cleaned Sprue to Yard Storage. *At the right:* Discharge End of Soft Iron Sprue Mill.

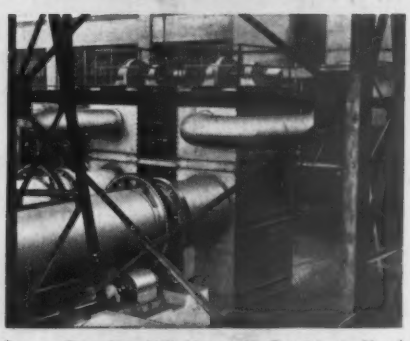
Our customers report that installing . . .

Sprue Mills

. . . pays big Dividends



Feed End of Hard Iron Sprue Mill in Knockout House of Large Automotive Foundry.



Sprue Cleaning Mill Mounted Outside in Yard of Large Automobile Foundry.

"Direct Savings Associated With Sprue Cleaning Paid for the Installation in Less Than 6 Months"

● Charging cleaned sprue into a cupola reduces the stone additives in some cases from 4% to less than 1½%, resulting in less coke consumption — faster melting — less slag to handle — reduced deteriorization to cupola linings. Cores from the knockout can be processed with the sprue to break lumps. This makes handling and disposal of waste sand easier and releases rods, gaggers and arbors for picking. Let us show you how profitable a completely mechanized sprue cleaning and waste sand handling installation can be.

DESIGNERS

ENGINEERS

BARTLETT-SNOW

CLEVELAND 5, OHIO

FABRICATORS

ERECTORS

Foundrymen Who Know — Buy Bartlett-Snow